In This Issue—*Tractor Service Operation*

MOTOR AGE

Volume XXXVII
Number 6

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, FEBRUARY 5, 1920

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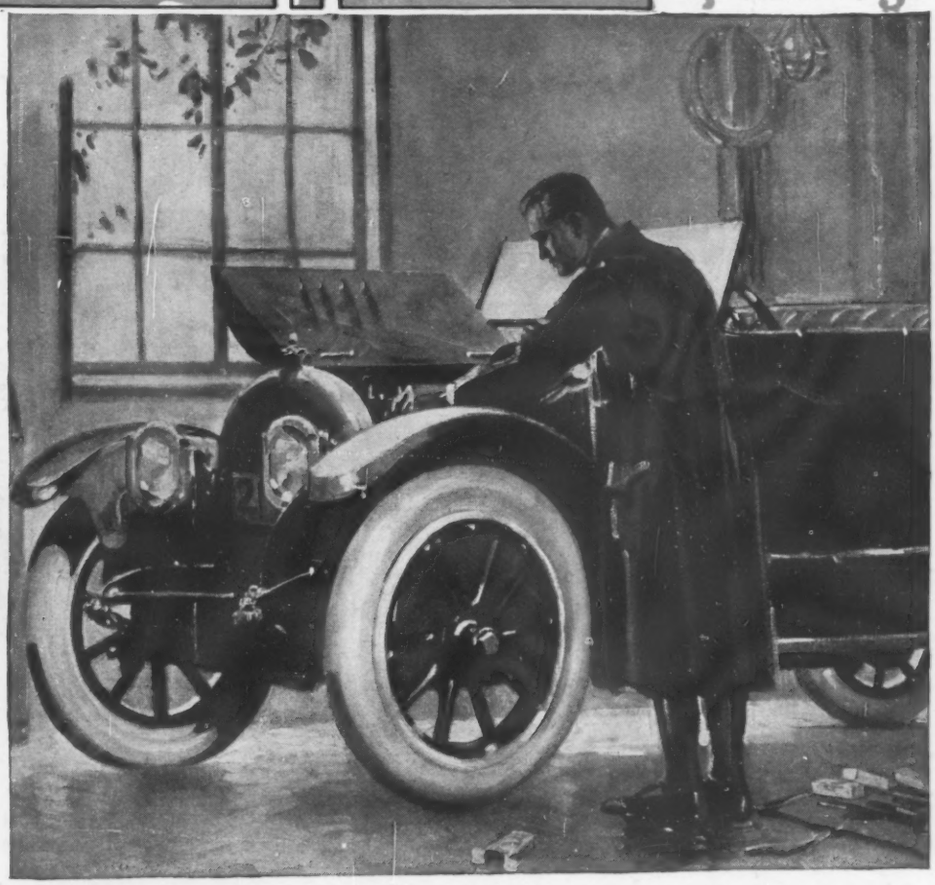

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Representative dealers and jobbers all over the world handle **Johnson's Car Savers.** Don't accept or handle unknown substitutes. Write for our booklet "Keep Your Car Young"—it's free.

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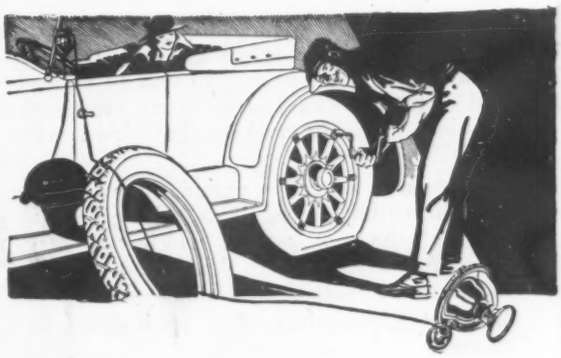

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MOTOR AGE

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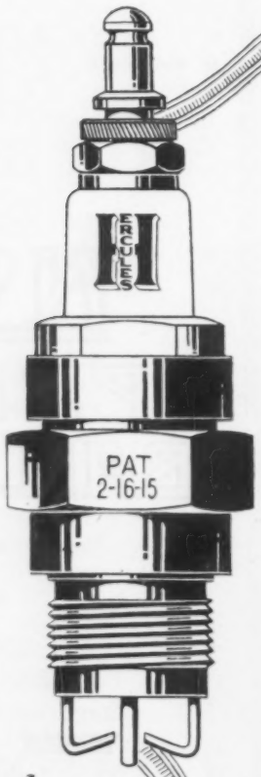

"OVER SIZE" means longer life—surer service—greater power to your engine

Equip complete with HERCULES. You not only get longer, better service—they actually stop compression leakage and eliminate porcelain breakage. Millions in use prove it. Spark Plug Size Chart for every sort of engine on request. Eclipse Manufacturing Co., Indianapolis, U. S. A.

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The Publisher's Service Station

Rendering Service to Help You Render Service

JOIN THE TRACTOR CLASS THIS WEEK!

Regardless of whether or not you are selling tractors, it will be to your advantage to start this week to study the photographic illustrations that MOTOR AGE presents in its series of articles on Standard Mechanical Operations in Tractor Service.

As your instructors, you have men who are well qualified to give you a real practical education on this subject. We feel confident that in this series of articles you will find the most complete and authoritative information and data ever presented.

The mechanical operations to be described are standard and therefore applicable to any automotive equipment that has the internal combustion engine. This means that although the tractor is being diagnosed from top to bottom, the operations which are described and illustrated are equally applicable to the motor car and truck.

Our editorial staff pronounces this series as so simplified that any one who knows how to operate automotive equipment will, after studying these articles, be able to perform any mechanical operation with the ordinary tools at hand.

Again we say "Join the class this week"! — take advantage of the opportunity MOTOR AGE offers you to secure a real, practical knowledge in standard mechanical operations in tractor service, and, at the same time, learn more about your cars and trucks. If you do you'll soon have a better knowledge of servicing your cars, trucks or tractors and, at the same time, be able to intelligently instruct your customers on how to take proper care of their cars, trucks and tractors.

THERE is no denying the fact that a Nash dealer contract is a mighty fine thing to have these days. Nash dealers in all sections of the country are successful because the Nash factory, in conjunction with Nash distributors everywhere, assure the Nash dealer a "square deal" at all times and make every effort to see that his business is permanent, profitable and steadily increasing in volume from year to year.

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Vol. XXXVII, No. 6 FEBRUARY 5, 1920 $3.00 Per Year

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MOTOR AGE

STANDARD MECHANICAL OPERATIONS in TRACTOR SERVICE

By JOHN CHARLES THORPE, M.E.
President Thorpe Amerman Motor Company, URBANA, ILL.

and GUSTAV HOWARD RADEBAUGH
Assistant Manager of Shop Laboratories, Mechanical Engineering Department, UNIVERSITY of ILLINOIS

IN beginning in this issue of MOTOR AGE the series of articles on Standard Mechanical Operations in Tractor Service, prepared by John Charles Thorpe, M. E., and Gustav Howard Radebaugh, MOTOR AGE is convinced it is giving to its readers the most complete and valuable series of articles on that subject ever written.

While necessarily the operations, and the photographs which illustrate them, are confined to a single make of tractor, this in no way detracts from their value as applicable to any piece of automotive equipment which contains an internal combustion engine. The operations described are standard, hence they will apply to any internal combustion engine whatsoever, whether it be a stationary engine or the power plant in a tractor, a motor truck or a motor car.

The operations which have been standardized, described and illustrated are just those common, everyday operations which every dealer and owner should understand and be able to do. There is not one which is beyond the skill of the man with average mechanical ability, nor is there one which cannot be performed with the tools which are common to any automotive repair shop, or which are accumulated by the average owner of a motor truck or motor car, or which should be found in the tool chest of the average farmer who owns a tractor. In fact, the operations are so simplified that any man who has the skill to operate his automotive equipment, after studying these standard operations, should be able to perform any or all of them with the tools he has.

MOTOR AGE believes this series will be of value to the automotive dealer from two angles:

First: It will instruct him in the common and more numerous operations he will be called upon to perform in servicing all kinds of motorized equipment. It will give him a knowledge of what to do and how to do it and it will perfect his skill.

Second: It will enable him more intelligently to instruct his customers and to convince them of the relative simplicity of the things they should know and the

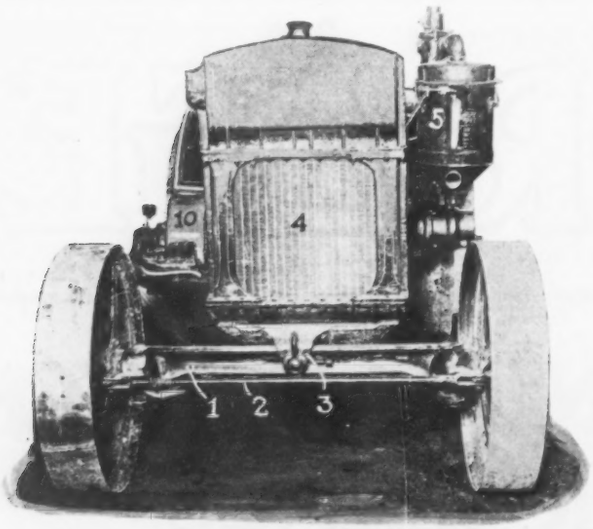


Fig. 1—Front view of tractor showing front axle, 1; steering arm, 2; method of front frame support, 3; radiator assembly, 4; location of air washer on the right, 5; and other essential features

things they will have to do in taking proper care of their motor trucks and tractors. Especially will this be valuable as respects the latter, because it rarely will be possible to bring the tractor to the shop, and attention must be given it on the farm. The farmer who knows how to meet the commoner of his mechanical difficulties with his tractor by means of the instruction given to him by the dealer is a better satisfied customer and is a time and money saver for the dealer. This series will result in this trade advantage to the dealer who reads it.

The dealer who has a thorough and intelligent comprehension of the common but essential things which must be done and who is in a position to impart this information to his customers not only enhances his own value and reputation as a dependable dealer but he saves himself unnecessary expenditure in time and money attending to service calls that should never be made.

That this series on Standard Mechanical Operations will do just these things is the conviction of MOTOR AGE and is the reason why the series will run through a considerable number of subsequent issues following the appearance of the first of the series.

Something should be said about the men who have prepared the series.

John Charles Thorpe, M. E., is president of the Thorpe-Amerman Motor Co. ,Urbana, Ill. He was born and raised on a farm in Illinois. After the usual elementary school experience he went to college and graduated from the Mechanical Engineering Departments of the Universities of Michigan and Illinois. After graduation he was for eight years in charge of Gas Engineering Laboratories in the Universites of Michigan, Washington and Illinois.

Leaving academic life he went into the motor car business and for the last ten years has been a distributer of automotive equipment at Urbana. He has specialized on merchandising and service methods and is a recognized authority on both. He is in constant demand as a contributor to class and technical publications and as a speaker on merchandising and service.

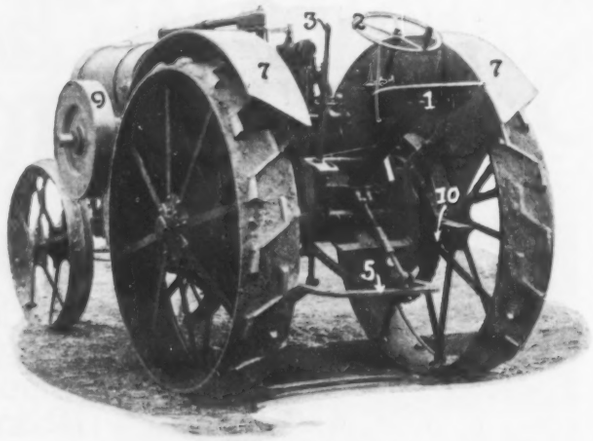


Fig. 2—Rear view of tractor, showing driver's seat, 1; steering wheel, 2; gear shift lever, 3; and draw bar hitch, 5

The standard operations he has included in this series are just those which have come up in the course of his theoretical and practical work as instructor and dealer and he has presented them in a way which makes them readily comprehendable by the non-technical reader.

Gustav Howard Radebaugh also traces his birth back to an Illinois farm. Common schools and a special course in mechanical engineering, followed by an apprenticeship as repair mechanic and instrument maker, fitted him for seven years' experience as a mechanical expert. His work during recent years has been a special investigation of time studies and standard mechanical operations in large western industrial plants. He is an expert in the application of photography to the portrayal of such operations. At present he is Assistant Manager of Shop Laboratories, Mechanical Engineering Department, University of Illinois.

Standard Mechanical Operations in Tractor Service

Introductory—Tractor Service

THE development of the farm tractor has introduced power farming, and farm power machinery must be considered the essential factor in future progress in agriculture.

The successful solution of the problems of food production and the efficient selection, care, utilization and maintenance of power farm machinery is beyond the capabilities of the man without good business judgment and procedure.

The new era of farm processes and farm life demands that today's and tomorrow's farming shall be a BUSINESS,—not a "rule of thumb" occupation, based upon the practice of years and generations gone by.

There is no greater step in the progress toward the highest attainable efficiency in farming than that the farmer shall continually strive for a better and more complete understanding of his equipment. It is because of the inevitably important fact that the tractor is destined to have a dominant place in the future progress of agriculture that the farmer must acquaint himself with the problems involved in tractor operation, care and maintenance.

Interruptions in the continuity of farm operations are not only sources of great inconvenience, but are often damaging to crop production and expensive to the point where a potential

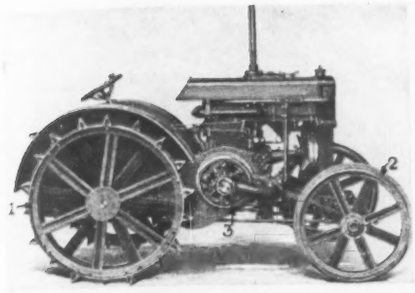


Fig. 3—Right side view of tractor, showing wheel construction, 1 and 2; power take off with support and belt pulley, 3; magneto installation and carbureter

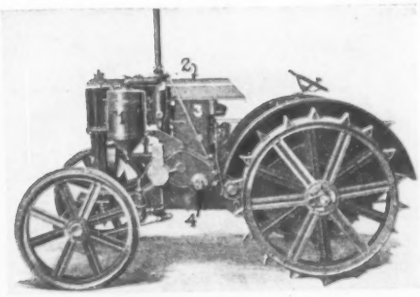


Fig. 4—Left side view of tractor, showing governor installation, air washer, steering arm connection, etc.

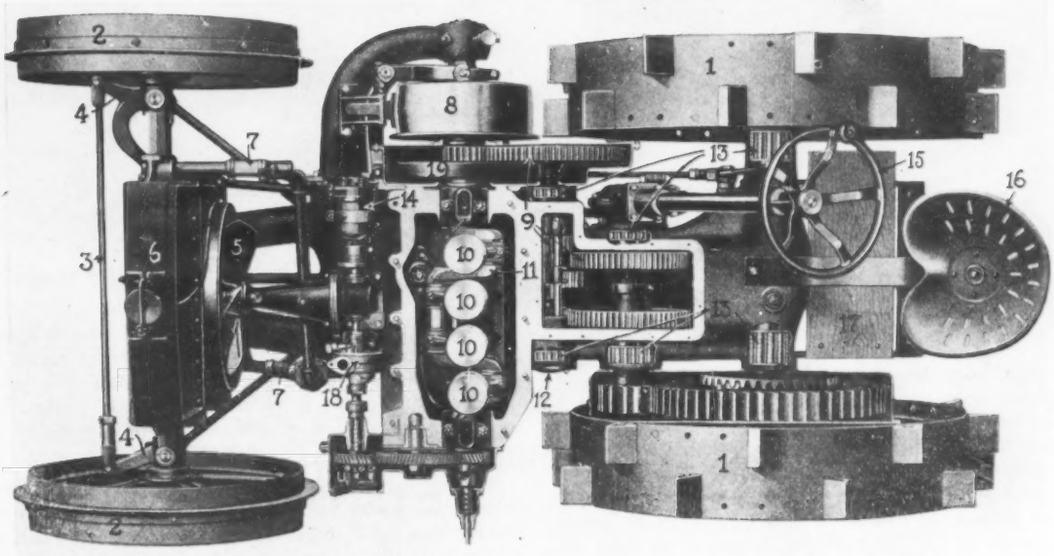


Fig. 5—Plain view of tractor with covers and fenders removed, showing gear assemblies, 9; pistons, 10; crankshaft, 11; counter shaft, 12; fan assembly, 7; roller bearing installation, 13, etc.

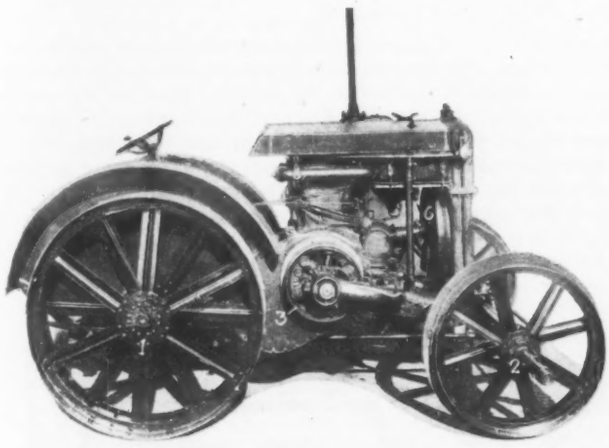


Fig. 6—Close-up view of motor right side, showing details of belt pulley and clutch for power take off, 3; magneto and carbureter installations

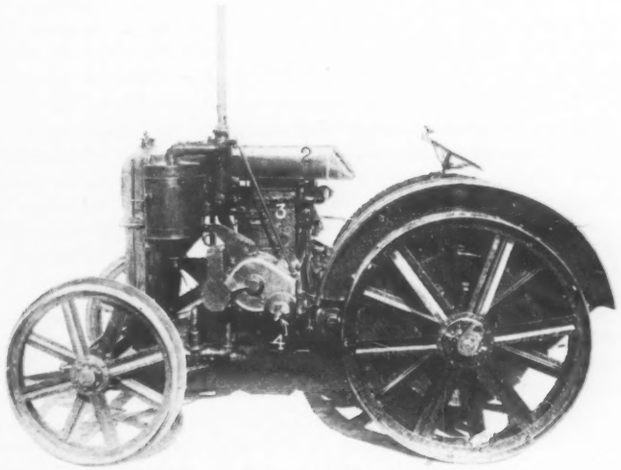


Fig. 7—Close up view of motor and accessories, showing air washer with connections, starting crankshaft, left side water connections, etc.

profit may become a loss. It is thus important that the farm tractor shall operate continuously, and when it ceases to do so, that the interruption shall be reduced to the smallest degree. A reasonable degree of intelligence in tractor operation, care and maintenance will go far toward the attainment of this end.

In the preparation of the material presented herewith, and in the succeeding articles to appear hereafter, it has been kept constantly in mind that lengthy technical discussions are not only unnecessary, but generally worthless in presenting tractor troubles and methods of remedying them. Only such technical terms as are necessary are used and endeavor has been made to eliminate any confusion by simple explanations, in the rather brief text that accompanies the illustrations.

A series of views are presented, together with brief specifications of the tractor used in the work, to give the reader and student a general working knowledge of the standard mechanical parts upon which the operations described are performed.

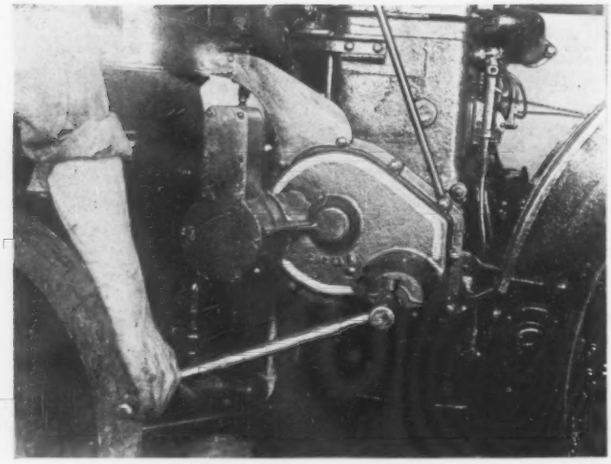


Fig. 8—To start engine the gasoline throttle should be open about one-third. The spark control should be advanced not over one-third of its full action. See that starting crank is firmly attached and in turning the engine over, use an upward pull. If it is more convenient to press downward on the starting crank be careful to see that the thumb is not around the starting crank handle, but at the side in line with the knuckle of the first finger. This is always an advisable precaution to prevent injury from possible back firing

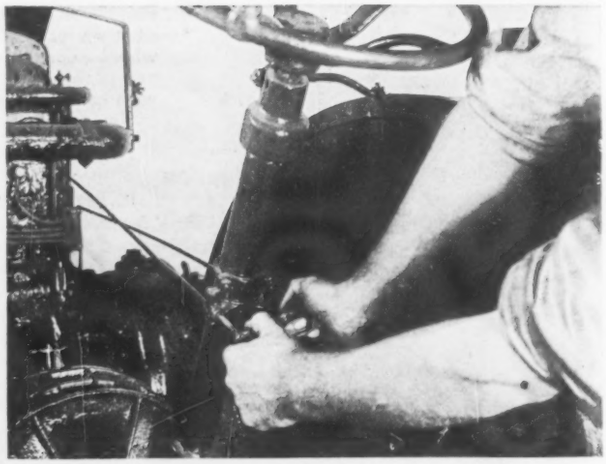


Fig. 9—To stop engine see that gear shift lever is in neutral position, or that clutch on the power take off or belt pulley is disengaged. Close gasoline throttle and place spark control lever in full retard position

A distinct line has been drawn between what may be termed Field Operations and Shop Operations for the reason that much damage may be done by the tractor operator attempting to perform operations in the field or in the farm shop that should not be thought of except as service station work. For example, —there are occasional demands for work on motor bearings, brought about by a lack of attention to lubrication or other causes. Any attempt on the part of the operator to take up bearings in the field is almost sure to bring about very unsatisfactory results. It is greatly to be desired that the operator shall have the ability to do this work and further that the farm shop shall be so complete that the work may be done there. These conditions positively must be met before it becomes advisable to attempt such work. Under ordinary circumstances and in the present status of the farm shop such operations as the above should be considered shop or service station work and generally should be performed by an expert tractor mechanic.

On the other hand, such operations as the repairing of the breaker points of the magneto, the testing and repairing of spark plugs, the repair and adjustment of the valve gear,—all standard operations—should be done by the operator and these operations would be classified as field work, that is, work that may be done in the field or in the farm shop.

In the composition and compilation of this series of material on tractor troubles a special effort has been made so to outline the operations that special tool equipment shall not be required and that the work shall contemplate only the facilities usually provided on the modern farm.

It will be easily understood that the preparation of material to cover all types of tractors in a treatise of the character contemplated herein would involve such an endless task that it would never be completed. It has been necessary therefore, to utilize one type in this work. The preparation of the material, however, is such that a study of the views and complementary text set forth will give the student an understanding of the methods employed so that they may be readily applied to the troubles experienced with all tractor machinery of standard manufacture. In some instances, such as concern magnetos and carbureters, several types are shown for the purpose of correlating the standard operations described.

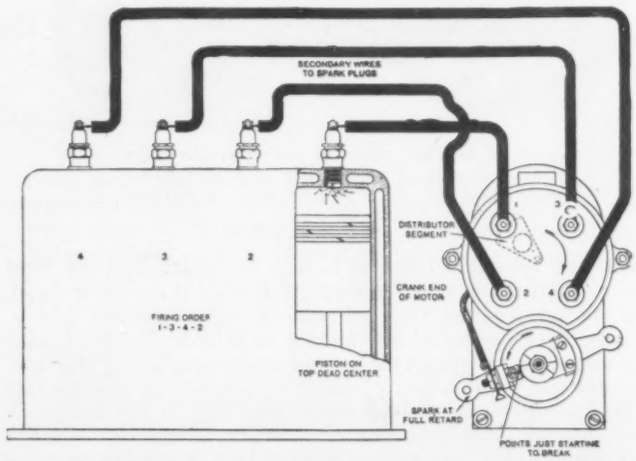
In our extensive experience with tractors and trucks, it has been a rare experience to find a power farmer who did not insist that the tractor and truck are necessary to a solution of the demand for more intense and efficient farming. There were many, however, who expressed dissatisfaction with their power equipment experience.

In most instances complaints were based upon unsatisfactory factory or dealer service that brought about serious interruptions in farm work. There is no doubt that many of these interruptions could have been reduced to insignificance by a thorough knowledge of general motor troubles and the means for correcting them.

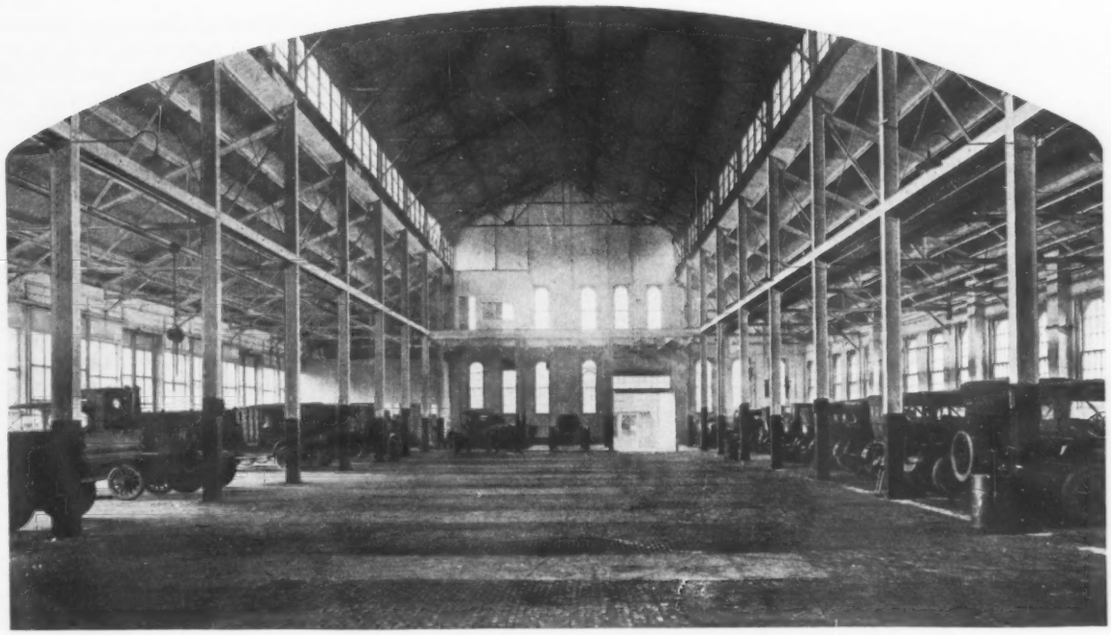
Special care is exercised therefore, in this series to place before the dealer and the power farmer, not only a course in tractor and truck repair and adjustments, but also such an exposition of the operator's hands and of the tools used. The an inspiration of such confidence that the calls upon the factory shall be reduced to a minimum.

A direct consideration of the subject of tractor and truck troubles will be taken up in regular order of the principal engine systems, as follows:—Ignition, Fuel Supply, Valve Mechanism, Cooling and Lubrication.

Operations will be presented by detailed views accompanied by such text as may be necessary for explanation and for connecting the procedure. The dealer is urged to study carefully the sequence of the views with particular reference to the position of the operator's hands and of the tools used. The text will provide the necessary information that may not be gained from the pictures. The material presented has been gained from actual service experiences and from the many remedies that might be used for the troubles described only such have been selected as may be found most practical.


SECONDARY WIRES TO SPARK PLUGS
DISTRIBUTOR SEGMENT
CRANK END OF MOTOR
FIRING ORDER 1-3-4-2
PISTON ON TOP DEAD CENTER
SPARK AT FULL RETARD
POINTS JUST STARTING TO BREAK

General wiring diagram for tractors employing magneto ignition



Main floor of the repair shop of the Southern Motors Co., Louisville, Ky., showing steel framework supporting travelling chain hoists and the general spacious layout.

THE HOUSE BEHIND THE CAR

Costs On All Repair Operations Have Been Standardized in This Concern as Result of Many Years' Experience

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It is one of the largest, if not the largest, establishment of its kind south of the Ohio River, having devoted exclusively to the sale and service of the lines it represents close to 100,000 sq. ft. of floor space. Sales and service, including adjustments and minor repairs, are handled at the Third street establishment, and major repairs in the shops fifteen blocks distant at Eighteenth and Walnut streets.

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Selling a maximum estimate on the cost of repairs has reduced owners' complaints to a low percentage and the system has tended to establish a greater confidence in the company on the part of the owners for the reason that the entire transaction is specific in every detail and the owner leaves his car with a definite picture as to the charge which he will be called upon to pay. All jobs are put through the shop on the time and material basis, the owner being given the benefit of any saving which may be effected in case of the actual cost of the work running less than the maximum estimate of the work which has been sold to him. This company's experience has been that 96 per cent of repair jobs going through the shop has been delivered to owners at a cost ranging from 10 to 20 per cent under the maximum estimate.

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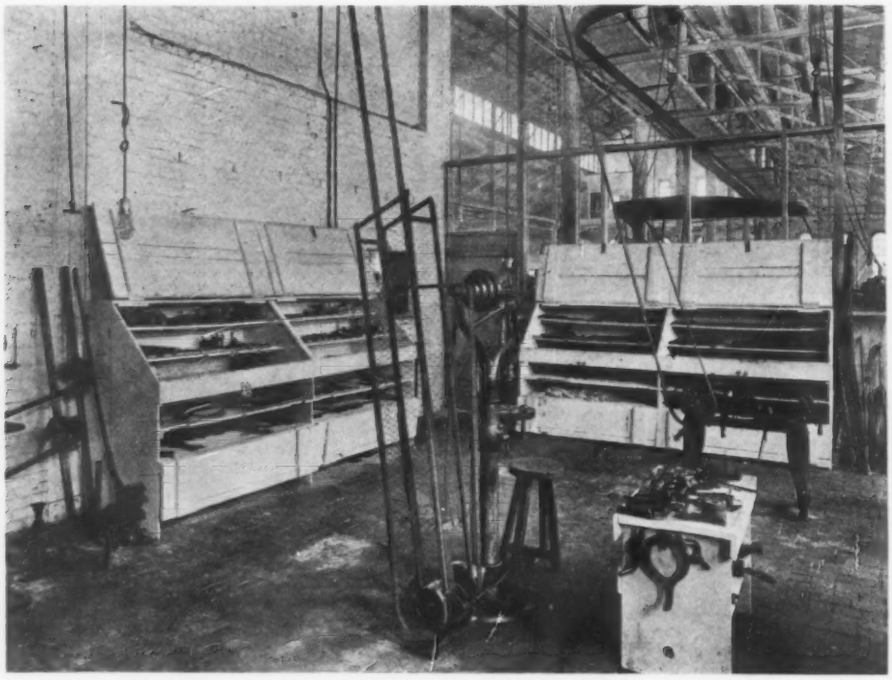

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other parts of the car are in such condition as to make its performance satisfactory in operation after the motor has been properly repaired. All repair work, including material and workmanship, is guaranteed and but one charge is made for a single operation, no matter how many times the job may be done over to make it perfect.

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Upon the acceptance of a car for repairs, the same is promptly tagged for identification, a cash or credit job being designated by the color of tag attached to radiator cap, all of which tags are serially numbered and carry a claim coupon which is given the owner and must be surrendered upon delivery of the car.

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Keep Mileage Records

It has been found advantageous to keep records of speedometer readings of all cars coming to the service station, as the average owner is inclined to charge the value of his car and the money expended in its upkeep on its length of service rather than upon the mileage basis. The company has succeeded in satisfying many complaining owners that their cars are giving really good service when their

REPAIR ORDER

Work Instruction Copy to be attached to car

SHEET No._____
OF _____ SHEETS
SUPPLEMENTARY R. O.'S.
A. B. C. D. E. F. G.

SOUTHERN MOTORS COMPANY
INCORPORATED

Customer's Name
Street Address
City State
Phone No.
Delivery Instructions
Terms Terms approved by

R. O.
Customer's Order No
Received 19____ A. M. P. M.
Est'd Delivery 19____ A. M. P. M.
Completed 19____ A. M. P. M.
Delivered 19____ A. M. P. M.

License No	Model—Series	Motor No	Date—Original Delivery 19____	Total Mileage

Item	Operation No.	OPERATION—BE SPECIFIC
1		
2		
10		

Billing price to be amount of actual labor and material used, but not to exceed $_____

Signed

Service Manager Service Salesman

1. If while above work is being performed additional work is found to be required, this Company will endeavor to secure customer's approval for extra expense and time involved.
2. This company is not liable for loss or damage to vehicle by fire, theft, casualty or accident and the vehicle is held at owner's risk
3. Except as noted hereon parts removed for renewal will be scrapped at once.
4. Storage will be charged at $____ per day, beginning 48 hours after notice of completion of order
5. All estimates are subject to immediate acceptance.
6. No claims will be considered unless presented within ten (10) days

I hereby authorize above order and agree to terms specified

Signed _____ Customer By _____ { Self / Chauffeur / Agent / S. M. Co. Emp. }

If signed by S. M. Co EMPLOYEE—by what authority { Phone / Letter / Telegram } Date _____ 19____

Form D-104 5-19-15M —OVER—

This side of the repair order is made out in a specific manner and signed by the customer, who gets a carbon copy. Another copy goes to the shop superintendent, while the cardboard copy is attached to the car for guiding the mechanics

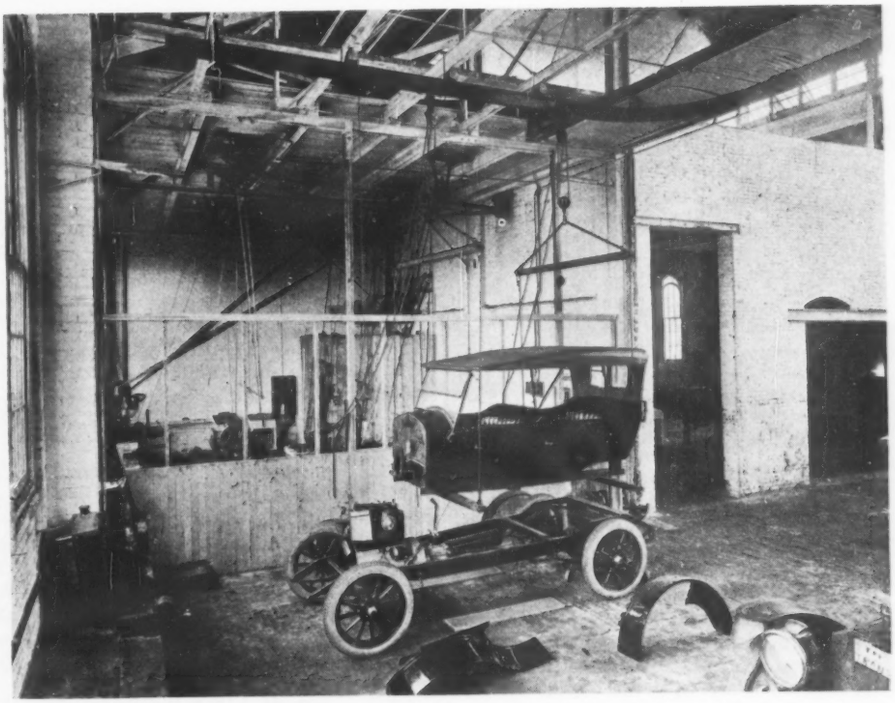
attention is called to the mileage performance over a given period. This record is also valuable in the case of the owner who is inclined to charge an unnecessary running of his car while the same is in the company's possession undergoing repairs.

The service and repair methods of this company, coupled with its new shops and enlarged facilities, have placed it far in the lead of the average automobile distributor in this section and such a favorable public impression has been created as to be very materially felt in a lessening of sales resistance on new automobiles and trucks.

Buildings Well Lighted

The shops are housed in a modern brick and steel factory building well ventilated and utilizing natural light to the best advantage, the interior being white.

In organization, the shop is departmentized, a force of mechanics and a working foreman being employed to specialize on the various lines handled by the company. A superintendent has general supervision of the entire shop. Repair work coming into the shop is promptly assigned to its proper department and the foreman in charge of the same immediately goes over the repair order and assigns the various operations to men under him who are best qualified by knowledge and experience to take care of the particular operation. Each repair force has its own men specialized in the principal assemblies, such as motor, transmission, clutch, rear axle and steering. Piston fitting, reboring and lapping in all makes of cars is handled by one man who has no other duties and is very expert in this particular line of work. In addition to the gang specialists above mentioned, electrical experts on the various types of ignition and starting systems are employed.



In the corner is the machine shop, which is completely equipped with lathe, drill press, etc. In the foreground is the hoist used for lifting bodies, etc. A feature of the shop is that there is plenty of light for performing repairs

In addition to the Packard truck, Packard passenger car, Dodge Brothers, Hudson and Essex general repair departments, the company maintains its own battery service and repair department. Also a radiator repair department, paint shop, acetylene welding, and is the local licensee of the Lawrence Process of scored cylinder repair. The shop is equipped with a modern machine shop and traveling cranes extending the full length of the shop on both sides. There is also a blacksmith shop and hoists for body changing and a shop parts' stock room operated independently of the company's main stock room in its Third street establishment.

Tools Checked by Tag System

Electrical testing and repair outfits are a part of the machine shop equipment, as is also a complete line of special labor saving tools. These tools are under the supervision of the machinist and are checked in and out by the tag system. All special tools after use on the job pass through the hands of the machinist for examination, and if found in need of repairs they are put in proper condition before being returned to the tool bins. All repair jobs are thoroughly washed and cleaned before being discharged as completed.

L. J. Hannah, general manager of the company, states that it is the purpose of the Southern Motors Co. to be "The House Behind the Car" in fact as well as

(Continued on page 14)

REPAIR ORDER ACCOUNTING—LABOR & COST SUMMARY

ITEM No. 1 / ITEM No. 2 / ITEM No. 3 / ITEM No. 4 / ITEM No. 5

Oper. No.	Est. Time	Price Estimated	Emp. No.	Hrs.	Labor Cost
Total			Total		

ITEM No. 6 / ITEM No. 7 / ITEM No. 8 / ITEM No. 9 / ITEM No. 10

Oper. No.	Est. Time	Price Estimated	Emp. No.	Hrs.	Labor Cost
Total			Total		

REQUISITION SUMMARY

Item	Req. No.	Quan.	Part No.	NAME	COST PRICE	LIST PRICE	CREDITS COST	CREDITS AMOUNT	Acct. No.
				TOTALS					

TIME RECAPITULATION

Item No.	Charge to Customer	Acct. No.	Acct. No.	Acct. No.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total				

COST RECAPITULATION

Labor Cost	Material Cost

BILLING TO CUSTOMER

HRS. LABOR @ $ ____ PER HOUR
MATERIAL AT LIST
MISCELLANEOUS
GROSS TOTAL
LESS CREDITS
INVOICE NO. NET CHARGE
ORIGINAL ESTIMATE

This shows the other side of the repair order which goes to the shop superintendent. On this side is written a complete history of the job or items laid out on the side of the card signed by the customer and which is shown on the opposite page

things they will have to do in taking proper care of their motor trucks and tractors. Especially will this be valuable as respects the latter, because it rarely will be possible to bring the tractor to the shop, and attention must be given it on the farm. The farmer who knows how to meet the commoner of his mechanical difficulties with his tractor by means of the instruction given to him by the dealer is a better satisfied customer and is a time and money saver for the dealer. This series will result in this trade advantage to the dealer who reads it.

The dealer who has a thorough and intelligent comprehension of the common but essential things which must be done and who is in a position to impart this information to his customers not only enhances his own value and reputation as a dependable dealer but he saves himself unnecessary expenditure in time and money attending to service calls that should never be made.

That this series on Standard Mechanical Operations will do just these things is the conviction of MOTOR AGE and is the reason why the series will run through a considerable number of subsequent issues following the appearance of the first of the series.

Something should be said about the men who have prepared the series.

John Charles Thorpe, M. E., is president of the Thorpe-Amerman Motor Co. ,Urbana, Ill. He was born

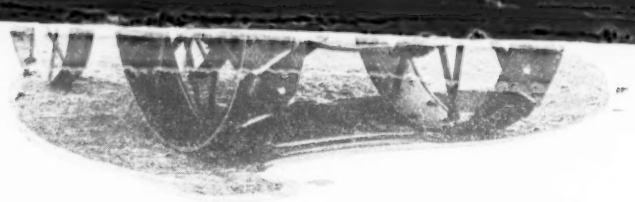


Fig. 2—Rear view of tractor, showing driver's seat, 1; steering wheel, 2; gear shift lever, 3; and draw bar hitch, 5

The standard operations he has included in this series are just those which have come up in the course of his theoretical and practical work as instructor and dealer and he has presented them in a way which makes them readily comprehendable by the non-technical reader.

Gustav Howard Radebaugh also traces his birth back to an Illinois farm. Common schools and a special course in mechanical engineering, followed by an apprenticeship as repair mechanic and instrument maker, fitted him for seven years' experience as a mechanical expert. His work during recent years has been a special investigation of time studies and standard mechanical operations in large western industrial plants. He is an expert in the application of photography to the portrayal of such operations. At present he is Assistant Manager of Shop Laboratories, Mechanical Engineering Department, University of Illinois.

Standard Mechanical Operations in Tractor Service

Introductory—Tractor Service

THE development of the farm tractor has introduced power farming, and farm power machinery must be considered the essential factor in future progress in agriculture.

The successful solution of the problems of food production and the efficient selection, care, utilization and maintenance of power farm machinery is beyond the capabilities of the man without good business judgment and procedure.

The new era of farm processes and farm life demands that today's and tomorrow's farming shall be a BUSINESS,—not a "rule of thumb" occupation, based upon the practice of years and generations gone by.

There is no greater step in the progress toward the highest attainable efficiency in farming than that the farmer shall continually strive for a better and more complete understanding of his equipment. It is because of the inevitably important fact that the tractor is destined to have a dominant place in the future progress of agriculture that the farmer must acquaint himself with the problems involved in tractor operation, care and maintenance.

Interruptions in the continuity of farm operations are not only sources of great inconvenience, but are often damaging to crop production and expensive to the point where a potential

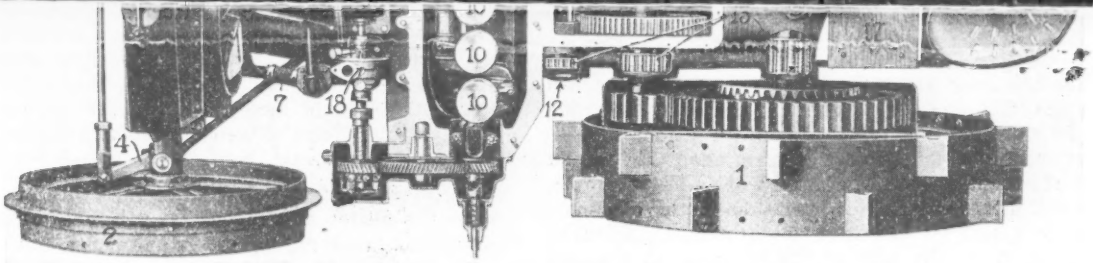


Fig. 5—Plain view of tractor with covers and fenders removed, showing gear assemblies, 9; pistons, 10; crankshaft, 11; counter shaft, 12; fan assembly, 7; roller bearing installation, 13, etc.

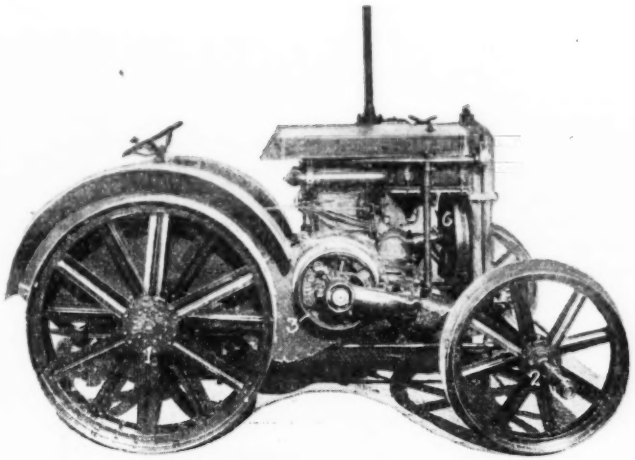


Fig. 6—Close-up view of motor right side, showing details of belt pulley and clutch for power take off, 3; magneto and carbureter installations

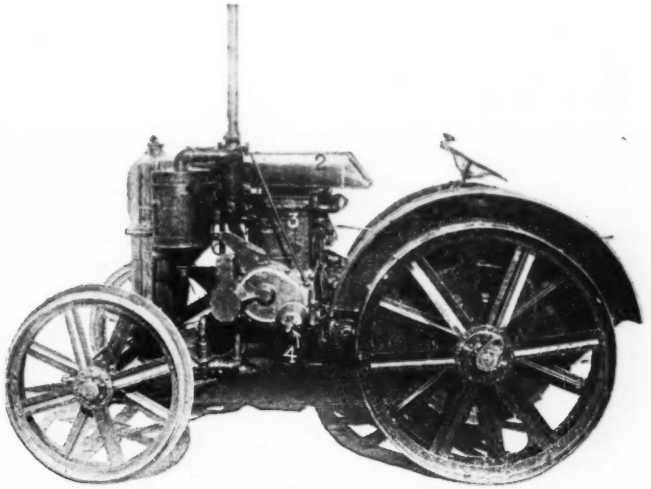


Fig. 7—Close up view of motor and accessories, showing air washer with connections, starting crankshaft, left side water connections, etc.

profit may become a loss. It is thus important that the farm tractor shall operate continuously, and when it ceases to do so, that the interruption shall be reduced to the smallest degree. A reasonable degree of intelligence in tractor operation, care and maintenance will go far toward the attainment of this end.

In the preparation of the material presented herewith, and in the succeeding articles to appear hereafter, it has been kept constantly in mind that lengthy technical discussions are not only unnecessary, but generally worthless in presenting tractor troubles and methods of remedying them. Only such technical terms as are necessary are used and endeavor has been made to eliminate any confusion by simple explanations, in the rather brief text that accompanies the illustrations.

A series of views are presented, together with brief specifications of the tractor used in the work, to give the reader and student a general working knowledge of the standard mechanical parts upon which the operations described are performed.

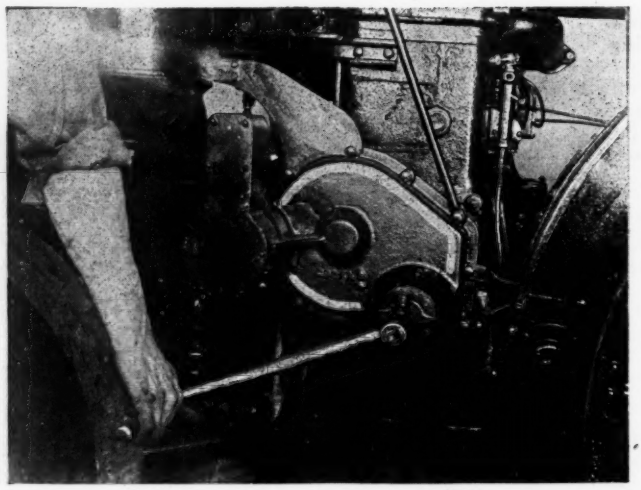


Fig. 8—To start engine the gasoline throttle should be open about one-third. The spark control should be advanced not over one-third of its full action. See that starting crank is firmly attached and in turning the engine over, use an upward pull. If it is more convenient to press downward on the starting crank be careful to see that the thumb is not around the starting crank handle, but at the side in line with the knuckle of the first finger. This is always an advisable precaution to prevent injury from possible back firing

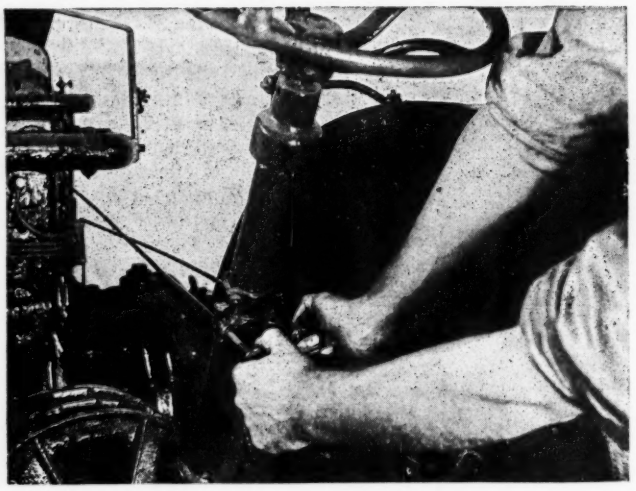


Fig. 9—To stop engine see that gear shift lever is in neutral position, or that clutch on the power take off or belt pulley is disengaged. Close gasoline throttle and place spark control lever in full retard position

A distinct line has been drawn between what may be termed Field Operations and Shop Operations for the reason that much damage may be done by the tractor operator attempting to perform operations in the field or in the farm shop that should not be thought of except as service station work. For example, —there are occasional demands for work on motor bearings, brought about by a lack of attention to lubrication or other causes. Any attempt on the part of the operator to take up bearings in the field is almost sure to bring about very unsatisfactory results. It is greatly to be desired that the operator shall have the ability to do this work and further that the farm shop shall be so complete that the work may be done there. These conditions positively must be met before it becomes advisable to attempt such work. Under ordinary circumstances and in the present status of the farm shop such operations as the above should be considered shop or service station work and generally should be performed by an expert tractor mechanic.

On the other hand, such operations as the repairing of the breaker points of the magneto, the testing and repairing of spark plugs, the repair and adjustment of the valve gear,—all standard operations—should be done by the operator and these operations would be classified as field work, that is, work that may be done in the field or in the farm shop.

In the composition and compilation of this series of material on tractor troubles a special effort has been made so to outline the operations that special tool equipment shall not be required and that the work shall contemplate only the facilities usually provided on the modern farm.

It will be easily understood that the preparation of material to cover all types of tractors in a treatise of the character contemplated herein would involve such an endless task that it would never be completed. It has been necessary therefore, to utilize one type in this work. The preparation of the material, however, is such that a study of the views and complementary text set forth will give the student an understanding of the methods employed so that they may be readily applied to the troubles experienced with all tractor machinery of standard manufacture. In some instances, such as concern magnetos and carbureters, several types are shown for the purpose of correlating the standard operations described.

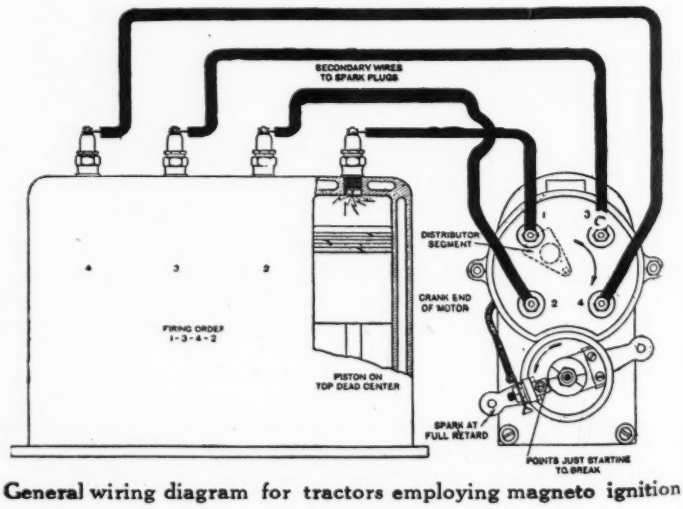
In our extensive experience with tractors and trucks, it has been a rare experience to find a power farmer who did not insist that the tractor and truck are necessary to a solution of the demand for more intense and efficient farming. There were many, however, who expressed dissatisfaction with their power equipment experience.

In most instances complaints were based upon unsatisfactory factory or dealer service that brought about serious interruptions in farm work. There is no doubt that many of these interruptions could have been reduced to insignificance by a thorough knowledge of general motor troubles and the means for correcting them.

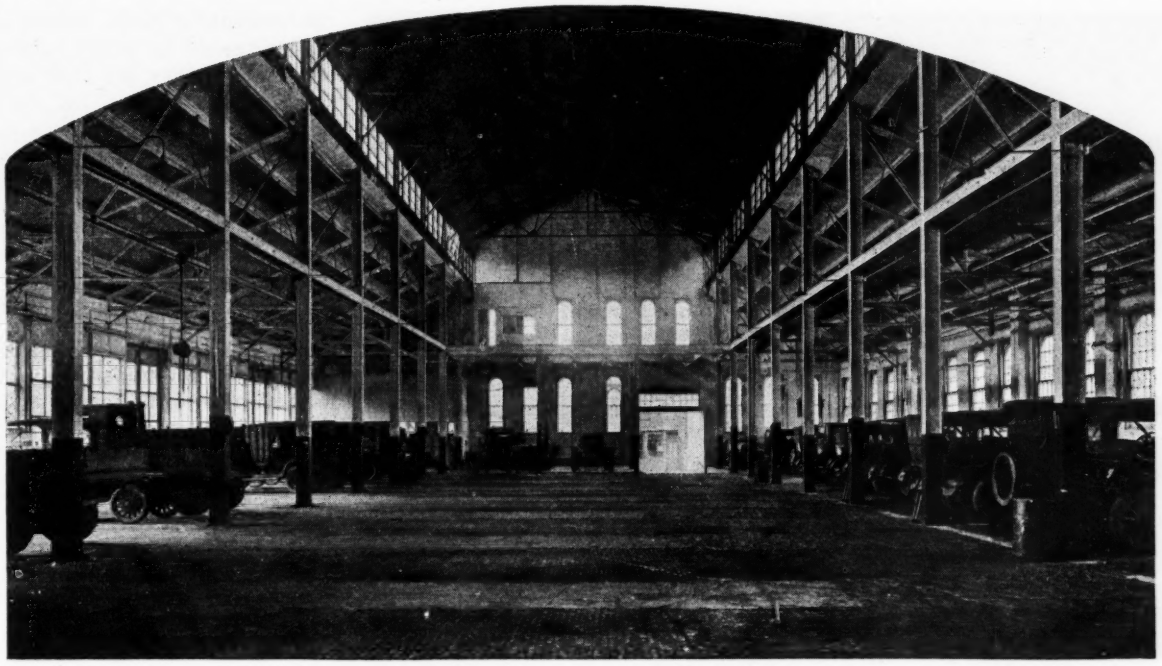
Special care is exercised therefore, in this series to place before the dealer and the power farmer, not only a course in tractor and truck repair and adjustments, but also such an exposition of the operator's hands and of the tools used. The an inspiration of such confidence that the calls upon the factory shall be reduced to a minimum.

A direct consideration of the subject of tractor and truck troubles will be taken up in regular order of the principal engine systems, as follows:—Ignition, Fuel Supply, Valve Mechanism, Cooling and Lubrication.

Operations will be presented by detailed views accompanied by such text as may be necessary for explanation and for connecting the procedure. The dealer is urged to study carefully the sequence of the views with particular reference to the position of the operator's hands and of the tools used. The text will provide the necessary information that may not be gained from the pictures. The material presented has been gained from actual service experiences and from the many remedies that might be used for the troubles described only such have been selected as may be found most practical.


SECONDARY WIRES TO SPARK PLUGS
DISTRIBUTOR SEGMENT
CRANK END OF MOTOR
FIRING ORDER 1-3-4-2
PISTON ON TOP DEAD CENTER
SPARK AT FULL RETARD
POINTS JUST STARTING TO BREAK

General wiring diagram for tractors employing magneto ignition



Main floor of the repair shop of the Southern Motors Co., Louisville, Ky., showing steel framework supporting travelling chain hoists and the general spacious layout.

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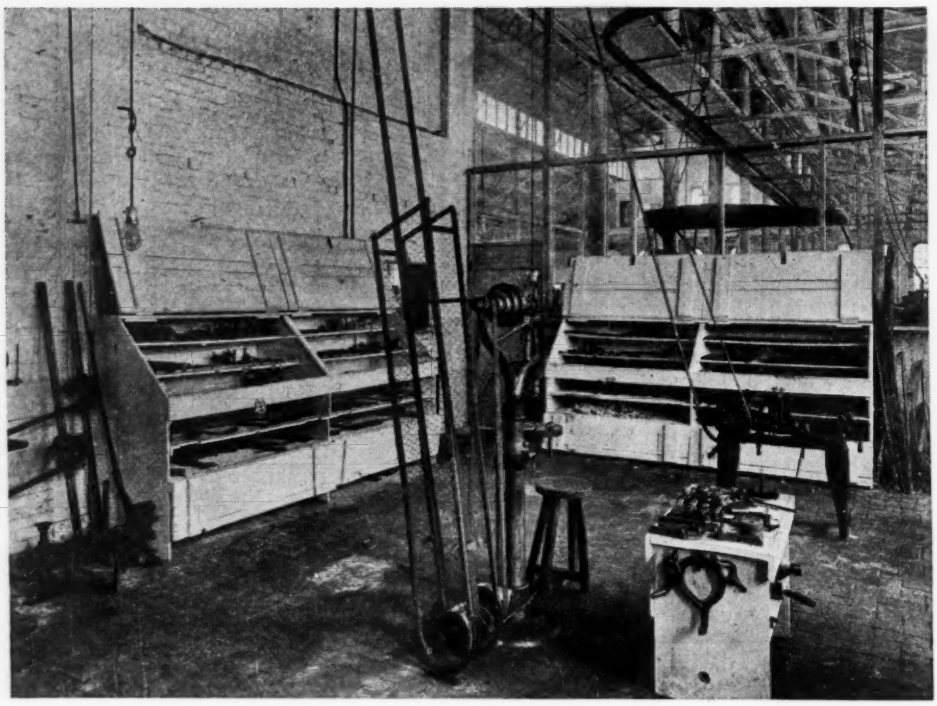

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As each repair operation is completed it is checked off of the repair order and the mechanics' time tickets are immediately turned in to the superintendent's office where they are filed together with stock requisitions in an envelope containing the superintendent's copy of the original order. When all operations have been completed the job is turned over to the shop inspector who goes carefully over the work and in most cases takes the car out for a road test. Upon being passed by the shop inspector the shop record of the job is closed, and in the case of a cash job the repair order is promptly figured up by the shop clerk, checked by the superintendent and the job returned to the service station where the service inspector, who had originally gone over the job with the owner at the time the car came in for repairs, carefully checks the shop work with a view to detecting any omissions or any defective work which may have been done by the shop, or overlooked by the shop inspector. The job is then ready for delivery to the customer and it is turned over to him upon the surrender of his claim coupon.

Keep Mileage Records

It has been found advantageous to keep records of speedometer readings of all cars coming to the service station, as the average owner is inclined to charge the value of his car and the money expended in its upkeep on its length of service rather than upon the mileage basis. The company has succeeded in satisfying many complaining owners that their cars are giving really good service when their

REPAIR ORDER

Work Instruction Copy to be attached to car

SHEET No.____ OF____ SHEETS
SUPPLEMENTARY R. O.'S. A. - B. C. D. E. F. G.

SOUTHERN MOTORS COMPANY INCORPORATED

Customer's Name
Street Address
City State
Phone No.
Delivery Instructions
Terms Terms approved by

R. O.
Customer's Order No
Received 19____ A. M. P. M.
Est'd Delivery 19____ A. M. P. M.
Completed 19____ A. M. P. M.
Delivered 19____ A. M. P. M.

License No	Model—Series	Motor No	Date—Original Delivery 19____	Total Mileage

Item	Operation No.	OPERATION—BE SPECIFIC
1		
2		
10		

Billing price to be amount of actual labor and material used, but not to exceed $____

Signed
Service Manager Service Salesman

1. If while above work is being performed additional work is found to be required, this Company will endeavor to secure customer's approval for extra expense and time involved.
2. This company is not liable for loss or damage to vehicle by fire, theft, casualty or accident and the vehicle is held at owner's risk
3. Except as noted hereon parts removed for renewal will be scrapped at once.
4. Storage will be charged at $____ per day, beginning 48 hours after notice of completion of order
5. All estimates are subject to immediate acceptance.
6. No claims will be considered unless presented within ten (10) days

I hereby authorize above order and agree to terms specified

Signed____ By____ { Self / Chauffeur / Agent / S. M. Co. Emp. }
Customer

If signed by S. M. Co EMPLOYEE—by what authority { Phone / Letter / Telegram } Date ____ 19____

Form D-104 5-19-15M. —OVER—

This side of the repair order is made out in a specific manner and signed by the customer, who gets a carbon copy. Another copy goes to the shop superintendent, while the cardboard copy is attached to the car for guiding the mechanics

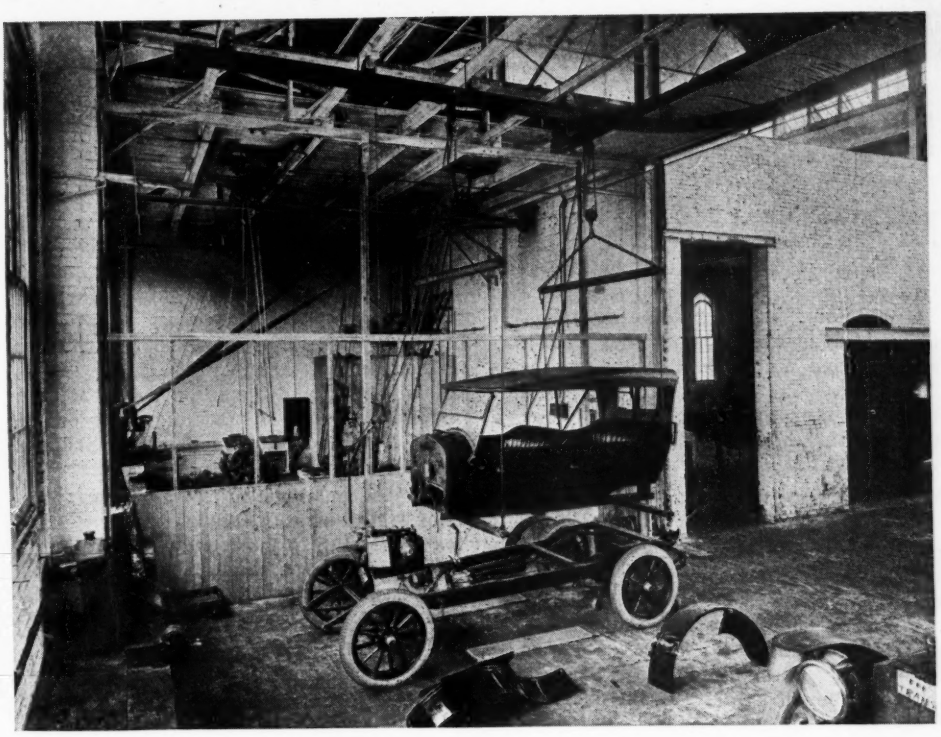
attention is called to the mileage performance over a given period. This record is also valuable in the case of the owner who is inclined to charge an unnecessary running of his car while the same is in the company's possession undergoing repairs.

The service and repair methods of this company, coupled with its new shops and enlarged facilities, have placed it far in the lead of the average automobile distributor in this section and such a favorable public impression has been created as to be very materially felt in a lessening of sales resistance on new automobiles and trucks.

Buildings Well Lighted

The shops are housed in a modern brick and steel factory building well ventilated and utilizing natural light to the best advantage, the interior being white.

In organization, the shop is departmentized, a force of mechanics and a working foreman being employed to specialize on the various lines handled by the company. A superintendent has general supervision of the entire shop. Repair work coming into the shop is promptly assigned to its proper department and the foreman in charge of the same immediately goes over the repair order and assigns the various operations to men under him who are best qualified by knowledge and experience to take care of the particular operation. Each repair force has its own men specialized in the principal assemblies, such as motor, transmission, clutch, rear axle and steering. Piston fitting, reboring and lapping in all makes of cars is handled by one man who has no other duties and is very expert in this particular line of work. In addition to the gang specialists above mentioned, electrical experts on the various types of ignition and starting systems are employed.



In the corner is the machine shop, which is completely equipped with lathe, drill press, etc. In the foreground is the hoist used for lifting bodies, etc. A feature of the shop is that there is plenty of light for performing repairs

REPAIR ORDER ACCOUNTING—LABOR & COST SUMMARY

ITEM No. 1			ITEM No. 2			ITEM No. 3			ITEM No. 4			ITEM No. 5		
Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated
Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost
Total			Total			Total			Total			Total		

ITEM No. 6			ITEM No. 7			ITEM No. 8			ITEM No. 9			ITEM No. 10		
Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated	Oper. No.	Est. Time	Price Estimated
Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost	Emp. No.	Hrs.	Labor Cost
Total			Total			Total			Total			Total		

REQUISITION SUMMARY

Item	Req. No.	Quan.	Part No.	NAME	COST PRICE	LIST PRICE	CREDITS COST	CREDITS AMOUNT	CREDITS Acct. No.
				TOTALS					

TIME RECAPITULATION					COST RECAPITULATION		BILLING TO CUSTOMER	
Item No.	Charge to Customer	Acct. No.	Acct. No.	Acct. No.	Labor Cost	Material Cost		
1							HRS. LABOR @ $ ____ PER HOUR	
2							MATERIAL AT LIST	
3							MISCELLANEOUS	
4								
5							GROSS TOTAL	
6								
7							LESS CREDITS	
8							INVOICE NO. NET CHARGE	
9								
10							ORIGINAL ESTIMATE	
Total								

This shows the other side of the repair order which goes to the shop superintendent. On this side is written a complete history of the job or items laid out on the side of the card signed by the customer and which is shown on the opposite page

In addition to the Packard truck, Packard passenger car, Dodge Brothers, Hudson and Essex general repair departments, the company maintains its own battery service and repair department. Also a radiator repair department, paint shop, acetylene welding, and is the local licensee of the Lawrence Process of scored cylinder repair. The shop is equipped with a modern machine shop and traveling cranes extending the full length of the shop on both sides. There is also a blacksmith shop and hoists for body changing and a shop parts' stock room operated independently of the company's main stock room in its Third street establishment.

Tools Checked by Tag System

Electrical testing and repair outfits are a part of the machine shop equipment, as is also a complete line of special labor saving tools. These tools are under the supervision of the machinist and are checked in and out by the tag system. All special tools after use on the job pass through the hands of the machinist for examination, and if found in need of repairs they are put in proper condition before being returned to the tool bins. All repair jobs are thoroughly washed and cleaned before being discharged as completed.

L. J. Hannah, general manager of the company, states that it is the purpose of the Southern Motors Co. to be "The House Behind the Car" in fact as well as

(*Continued on page* 14)

Twin Cities Industrial Show Automotive in Character

Big Building Is All Too Small to House Great Exhibition of Trucks, Tractors and Motor Cars

MINNEAPOLIS, Jan. 31—The Twin Cities are outdoing all their previous efforts with their automobile, truck, tractor and industrial show this year. The immense Overland building, just two blocks inside the St. Paul city limits, is so crammed with exhibits that one wonders where the crowd is going to find room to move around. Crowds always come to the show here, the entire Northwest contributing.

Show is Automotive

The show, while predominantly automotive, includes also industrial features which picture the commercial activities of the Northwest. In all there are 1388 exhibits of which 253 are industrial, the remainder being automotive or pertaining to the automobile industries. The total number of exhibits is 391 more than there were in the show last year.

Because the Overland building is warehouse construction, with relatively low ceilings, it is impossible to get vistas like some of those presented in the "Exposition Building" last year. This detracts from the beauty of the show, somewhat, of course, and it has made the labor of decorating more difficult, but even so, enough of the show can be seen at once from many points to impress the visitor with its immensity.

All four floors of the Overland building are needed, the tractor show including 248 models of tractors and power farm operative machine occupies the first floor and gives overpowering evidence of the immensity of the industry which is growing up around the power farming idea. Here are tractors of every kind from the little Beeman garden variety to the enormous Pioneer with its 144-in. drive wheels and frame big enough for a locomotive. The display of power equipment is varied but is not so comprehensive as might have been expected.

The second floor is given up to industrial and accessory displays in bewildering variety. The third floor has the automobiles, while on the fourth floor are the industrial displays and the commercial cars. There are 360 automobiles displayed and 232 commercial cars. Indeed the commercial car section rivals the Chicago show in variety and comprehensiveness.

Decorations Are Unique

The decorations are unique. The side walls and ceilings are entirely covered with painted canvas. In the automobile section the side walls represent an orchard in full bloom, while the lights are clustered in circular lambrequins. Considering the low ceilings the resultant effect is very pleasant. On the accessory and tractor floors the side walls show landscapes which enhance the distances and lend an out-of-door aspect to the show which is a very appropriate setting for tractors. The ceiling is festooned in squares with lights in the center of each.

The adjuncts which visitors to the Twin Cities show are accustomed to find are all there, including eat shops, refreshment booths, band concerts and other amusements. Manager Walter Wilmot believes in giving his patrons their money's worth when they come to his show and they surely get it.

Long lines were standing this morning when the doors were opened and all day the crowds continued to come. It's estimated that at least 30,000 paid admissions will have been taken in at the gates before closing time tonight. This is a record for the first day even here.

SMITH GETS LAFAYETTE IN CHICAGO

Chicago, Feb. 2—Henry Smith has been appointed distributor for LaFayette cars in Chicago. Mr. Smith is known to the automobile trade as sales manager of the motor parts department of the Rich Tool Co. of Chicago. It was in this capacity that he became acquainted with the various car makers, affording an insight that led to the selection of the LaFayette as his individual venture.

Although a Chicagoan, Mr. Smith has acquired extensive business experience in other cities, including Detroit and Newark, N. J. He is a graduate of Princeton and 35 years old. He is widely known in the trade as Harry Smith.

THE HOUSE BEHIND THE CAR

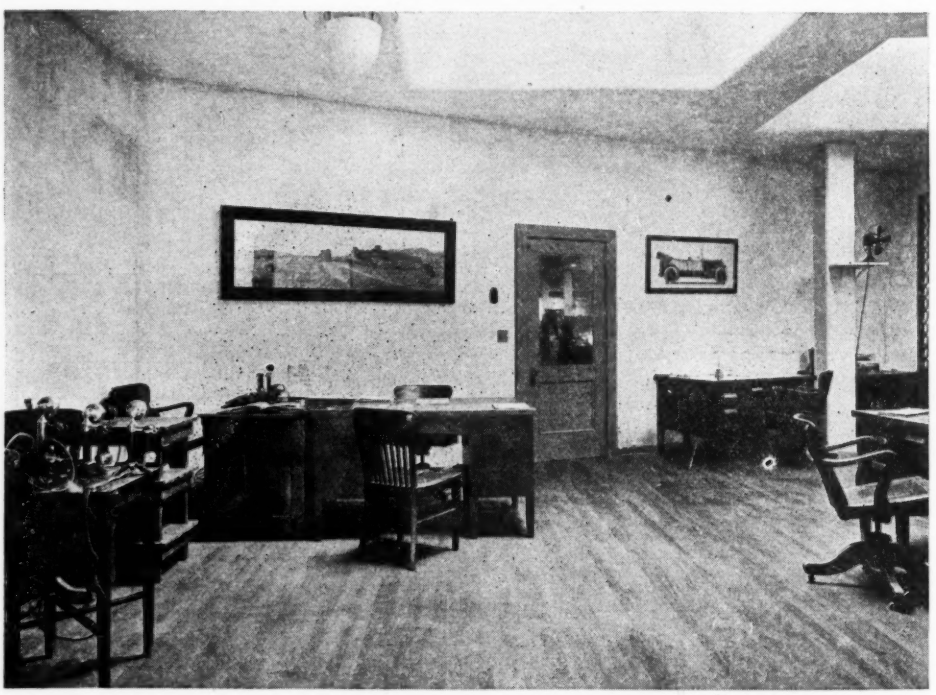
(*Continued from page* 13)

in name, and to this end unusual care has been taken to safeguard the interests of its owners to obtain for them the maximum performance of their cars at a minimum cost. This company believes that the greatest single influence for the expansion of its business is the satisfaction and support of its owners, which satisfaction and support can best be obtained by correct service facilities and methods intelligently applied. No expense or effort in the attainment of this end is spared.

W. M. Tucker is the service manager charged with the responsibility of carrying out the company's exacting service policy.

EQUIPMENT MEN MEET; PLAN 1920 PROGRAM

New York, Jan. 30—About 40 members of the Eastern Automotive Equipment association attended the annual meeting and luncheon at the McAlpin Hotel here last week. A report of the accomplishments during 1919 was enthusiastically received. The program for 1920, which contemplates the extension of the activities of the organization, is to be issued within a few days.



The service sales office of the Southern Motors Co. To sell service intelligently it will become necessary for dealers generally to adopt the idea of receiving customers in a well-equipped and clean office

Lighter Parts May Mean Better Service

Being One of the Thoughts Brought Out at the Recent Chicago Technical Session of the S. A. E.—Other Papers on Ordnance Work and Questions on Pneumatic Tires for Trucks

AMONG the more important ideas brought out at the technical sessions of the Society of Automotive Engineers, held during the Chicago show week at the Hotel La Salle, so far as the automotive dealer is concerned was that of cutting down service work on cars and trucks by the employment of aluminum alloy on parts representing unsprung weight.

A paper by A. H. Edgerton of the Aluminum Castings Co., Cleveland, Ohio, on decreasing unsprung weight by the use of aluminum showed that aside from a saving in fuel and tire wear, the use of aluminum wheels on trucks cuts down the service work to the extent that bearings in the wheel hubs and rear axles need less attention because of receiving lighter blows.

Save 500 Pounds by Aluminum Wheels

There was a saving of 500 lb. on a 2-ton truck when the latter was equipped with aluminum wheels, in place of steel wheels. Passenger car wheels have been made lighter than either wood, wire or steel wheels. The aluminum wheels were lighter than the wire wheels and 40 lb. lighter than the steel. They are made detachable in the same manner as wire wheels. For trucks the wheels are machined only on the bearing mounts, tire seats, etc., while on passenger car wheels the whole outside of the wheel is faced off for appearances. Both spoke and disk types of aluminum wheels have been experimented with, and as far as weight is concerned they run about equal. There is, of course, a little more work connected with casting the spoke type of wheel, but in the tests there was no difference in the performance of the two, the disk showing up as well as the spoke type, and vice versa.

The service men whose jobs it is to keep vehicles in order readily can see that the future holds out great things in the way of decreasing unsprung weight from the use of lighter metals. It not only means such parts as wheels, but axles, etc., will be easier to handle and much of the present day shop machinery necessary for handling heavy parts can be made lighter and less bulky. Mr. Edgerton's paper dwelt chiefly with the improvement of riding qualities, better acceleration and economy in tire wear.

Regarding tire wear some interesting facts were brought out in a laboratory test to determine what effect a high vibrating action or constant pound would have on the wheel and tire. An aluminum wheel weighing 82 lb. fitted with a 36 by 6 in. tire was put on one side of the experimental truck. On the other end of the axle a steel wheel was used weighing 248 lb. with tire. The wheels were brought in contact with large cast-iron drum 16 ft. in circumference arranged with ¾ in. high cleats spaced about 4 ft. apart. The truck was secured by chains against forward and lateral movements and as the drum was free to rotate it was possible to drive the truck on its own power at such a speed that the tires and wheels received tremendous pounding. The test was equivalent to a run of 500 miles at 15 m.p.h.

At the conclusion of the test the tire on the steel wheel showed some deep cracks across the face while on the tire fitted to the aluminum wheel there were small fractures around both outer edges or corners of the tire, but the central portion of the tire remained as good and as solid as at the beginning of the test. The fractures in the tire on the steel wheel were from 5 to 8 in. apart and in one instance the fracture penetrated the whole thickness of the tire. There was no sign of metal fatigue in case of the aluminum wheel.

Tire Removal Facilitated

One of the advantages of the aluminum wheels is the ease of tire removal where pneumatics are used, besides aluminum will not rust and as the aluminum wheel brought out by this concern has a rim and side ring of the same material there is no danger of the tire "freezing."

Other papers presented at the meeting during the morning session included "Artillery Motorization as Related to Caterpillar Traction," by George W. Dunham, and "Tractor Testing From the User's Standpoint," by Prof. L. W. Chase of the University of Nebraska. Prof. Chase has worked out a comparatively simple method whereby it is claimed that all tractors tested by it will be given a rating under practically uniform conditions. During the afternoon session there were papers on "The Relation of Solid and Pneumatic Tires to Motor Truck Efficiency," by S. V. Norton; "Design of Pneumatic Tire Trucks," by C. M. McCreery, and "A Tractor Engine Test," by C. A. Norman and B. Stockfleth.

The high spot of Mr. Dunham's paper resolved itself into a question as to whether or not the ordnance department should draw up plans for its own engines or co-operate in such a manner with the manufacturers of commercial engines whereby the latter could in emergencies be adopted almost bodily for government use. Prof. Chase in his paper illustrated by stereopticon views the thorough manner in which the agricultural engineering department of the University of Nebraska went about to evolve its tractor testing car and tractor testing course. The piece of apparatus including the traction dynamometer is known as the Nebraska Dynamometer car.

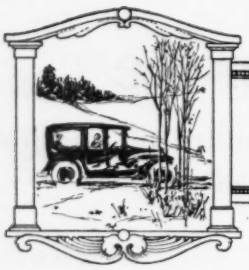
Regarding the design of pneumatic tired trucks some interesting facts were disclosed which bring home the idea of why it is not possible in most cases to adapt pneumatic tires to present day trucks without altering their design to a great extent. Some of the reasons advanced by Mr. McCreery were as follows: Fitting pneumatics to a truck means cutting down the wheels and it is a difficult job to to go back to the former type should this become necessary. The larger diameter of the pneumatic tires upset the fender and body clearances and materially effect the gear reduction in the rear axle. One of the greatest difficulties, however, lies in the fact that the tires having a higher potential speed will speed up the engine which may not be built to sustain such speeds. In this respect, other problems like oiling and cooling come up. Brake efficiency must be increased at least 100 per cent to take care of the extra speed and it becomes necessary to install some sort of air supply on the truck in case of emergencies. Where truck operators are contemplating changing to pneumatics it was deemed advisable to first consult with the truck manufacturer.

FRENCH TRACTORS SUBSIDIZED

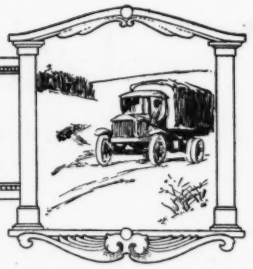
Paris, Jan. 17—Government subventions offered to purchasers of agricultural tractors now give an advantage to machines of French construction. The purchaser of a French tractor, who undertakes to fulfill certain simple conditions, can obtain from the Government a subsidy equal to 25 per cent the purchase price if the machine is of French origin. If an imported article the subsidy is reduced to 10 per cent. In the past the subsidy was the same whatever the origin of the machine.

INVESTIGATE "GAS" PRICES AS UNFAIR

Atlanta, Ga., Jan. 30—Following charges that some of the local filling stations are charging exorbitant prices for gasoline, John A. Manget, Federal Fair Price Commissioner for the State of Georgia, has appointed a committee to make a thorough investigation. This committee will report its findings in the course of a few days and if it is learned that the dealers are selling gasoline at exorbitant prices, as they are charged, federal prosecution for profiteering will follow. Mr. Manget has been exceptionally active in this work having already investigated the grocers, shoe dealers, druggists and clothing merchants, but this is the first time he has extended his operations to include the automobile dealers. Only the prices of gasoline are to be investigated.



EDITORIAL



Make the Truck Shows Self-Supporting

IT is indeed a pathetic situation when truck manufacturers go to vast expenditures and trouble to put their products into an excellent exhibit like the Chicago truck show only to find a handful of potential buyers there during show week, to say nothing of the automobile dealers who in the future certainly must be looked upon to handle more and more trucks. True, there were some buyers and some dealers, but these were not commensurate with the show.

THOSE of us who saw the show, saw the greatest exhibition of commercial vehicles, parts and accessories ever displayed under one roof, and yet the users of trucks like coal merchants, grain dealers, lumber dealers, and vast numbers of other users of large numbers of trucks were not there.

IT is one thing to get the makers of trucks to exhibit, but a far more important job to advertise such an exhibit properly. There is little use in getting together such a comprehensive display of trucks if the show does not bring in the persons most vitally concerned. The truck business is altogether different from the passenger car situation, because in the former it is not uncommon for a single concern to own from forty to fifty or more trucks, whereas the average passenger car buyer purchases one car for a season or two and buys another. Rarely does he own more than two cars.

IT seems what should have been done in connection with the Chicago truck show is to have advertised it for two or three months past in the trade papers catering to the merchants and manufacturers making up part of the 30,000,000 people within a few hundred miles of Chicago. This would have reached the potential buyers and informed them of the great possibilities at the show because here were the trucks, the engines used in them, the transmission and every other part, so that there was the best possible chance for the potential buyer or prospective dealer to find out why this or that particular engine was considered the best in a certain make of truck. The parts makers were there to back up the truck makers but the men they wanted to talk to most were not there. Certainly it seems that if future truck shows are to be handled on this basis the outlook is very poor so far as their success is concerned. What is needed is a show that is self-supporting. The truck industry is big enough to warrant such a show.

The Lesson of the Marmon Exhibit

IN a year when novelties at the automobile shows are only too rare, the exhibit of engine assembling and disassembling made by the Nordyke & Marmon Co. at the National shows at New York and Chicago was a blessing. As a novelty, its potency was shown by the big crowds, especially at Chicago, which surrounded the booth where it was held.

BUT of far more importance than its mere value as a novelty to draw crowds, is its importance as an educational signboard to manufacturers and dealers. Those big crowds, composed both of the automobile public and of the automobile business men, showed how vitally interested both public and business is in the question of maintenance and service.

NORDYKE & MARMON were able to stage this display because the war taught that company the possibility and the advisability of working to closer limits—a resultant of airplane engine construction. The Liberty motor contracts of the Marmon company called for both quantity production and hairline accuracy of work. And the lessons learned redound to the advantage of the motor car industry.

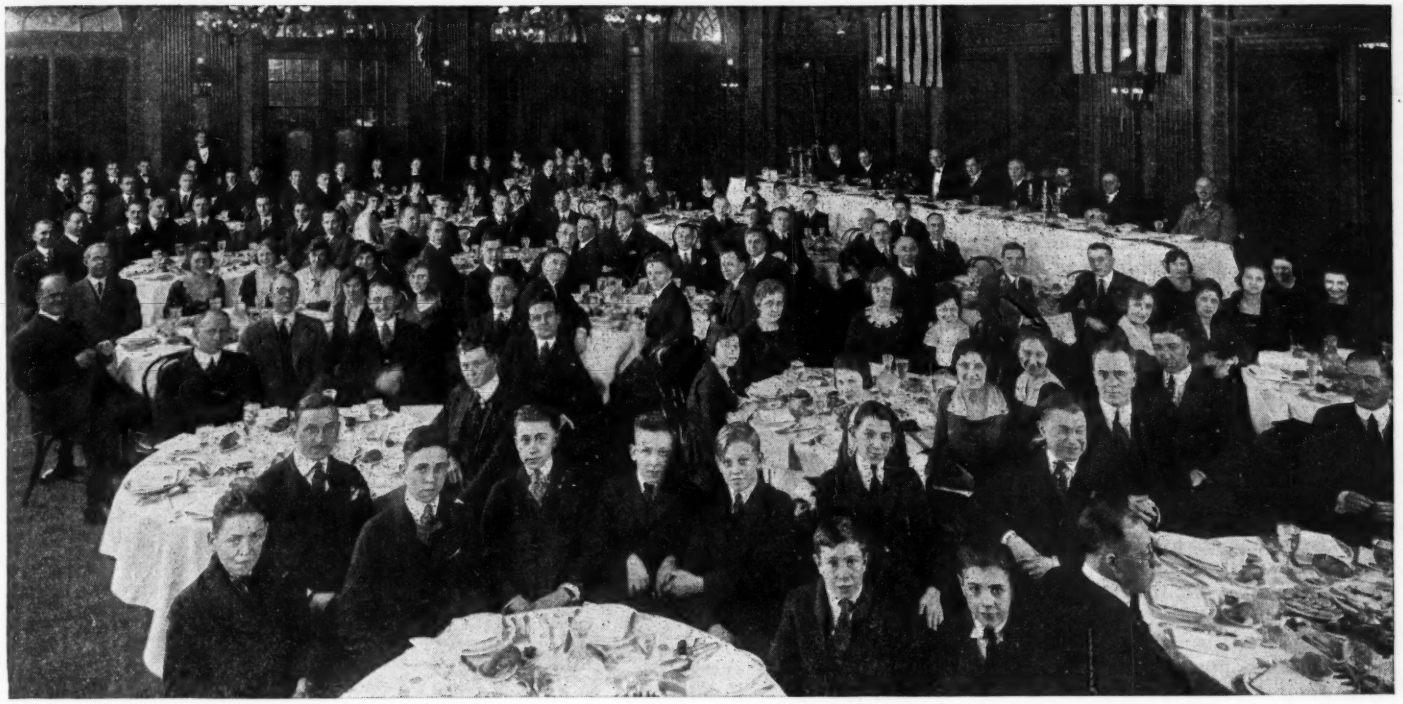
IT would have been impossible a few years ago for any such exhibition as the Marmon staged. In those days, despite the tremendous improvement in standardization of production, there was a certain amount of hand work required in assembling an engine. And when hand work was required of the manufacturer, it meant that extra labor would be required of the man who had to replace, in his repair or service shop, any part of that engine. The close limits to which manufacturing is done now, however, has eliminated most of this labor and makes servicing work much easier and much better.

THE big crowds which watched the Marmon exhibit demonstrated the intense interest both the public and the trade is taking in the question of service. For years service was something that a car buyer thought of after he had purchased his car and the dealer thought of after he had sold it. The time is coming when both buyer and seller will consider the service on a car before the sale is made.

Fuel by Pipe Line

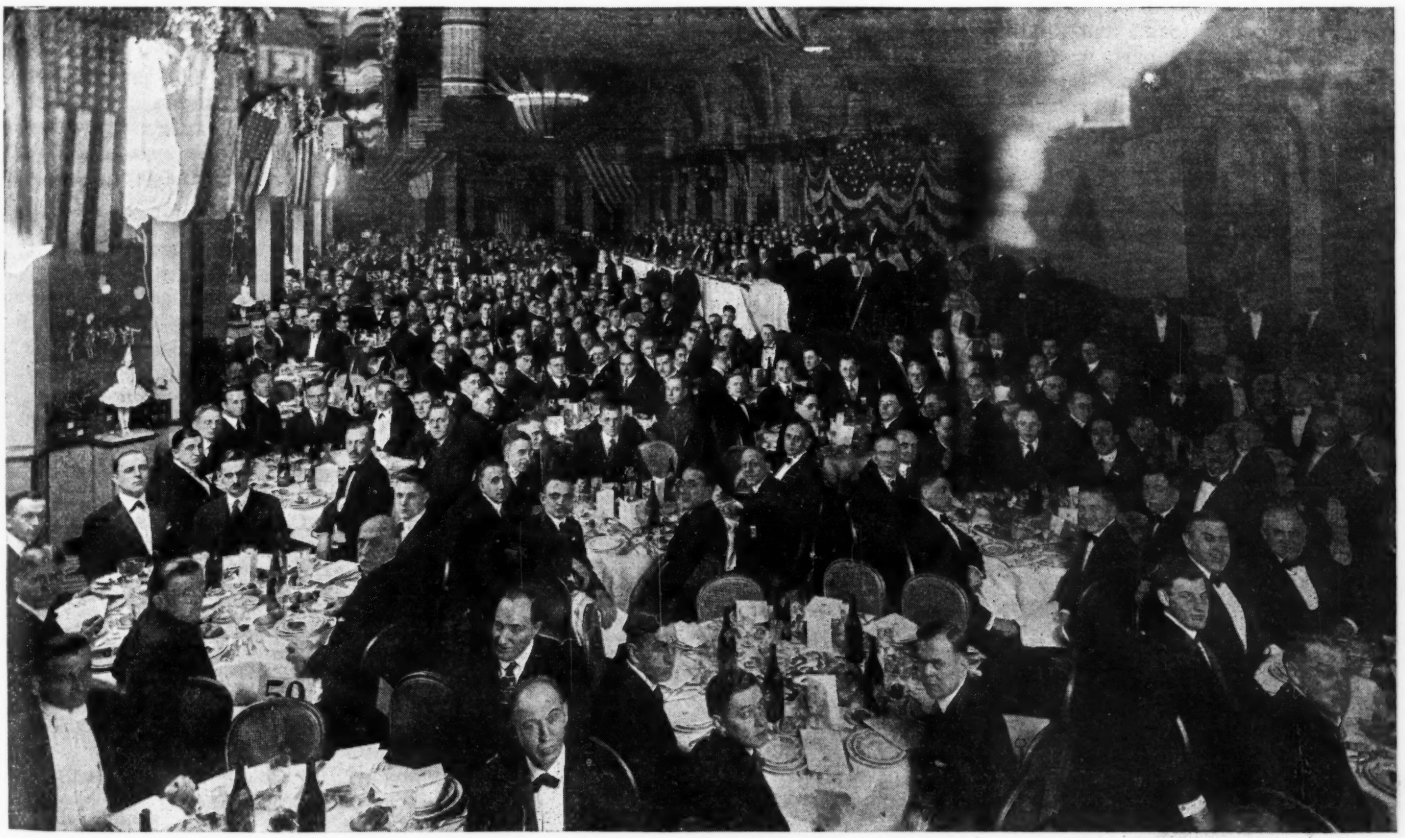
IT is not at all improbable that in the near future the service station using a measurable quantity of fuel in a day will have it delivered via pipe line rather than tank truck. This is going to work a great change in the gasoline dispensing systems no doubt and also facilitate the billing and booking problems. Also the loss through evaporation, which today is very important, will be cut down. Imagination pictures the fuel meter man making his monthly visit to inspect the meter and record the quantity of fuel used. Then the service station proprietor is billed in the regular way, just as he now pays for his gas and electricity.

A SYSTEM of this sort is not an idle dream for plans are now under way in New York whereby fuel oil users, consumers of large quantities, are to be given just this same kind of service. Whether this service will be more completely extended in the future, to include the car owner to have his garage piped for gasoline, is, of course, highly problematical, but the service station pipe line fuel delivery is inevitable, if the industry's strides in the future are to be reckoned from the records of the past. The delivery of fuel in this manner should also tend to lower the cost to the consumer by the reduction in transportation costs.



The Class Journal Co. felt it was honestly entitled to a little dinner last week to celebrate the Annual Shows and Specifications Issue of Motor Age for January 29 and we hope our readers agree with us. We'll give you a little inside stuff on that big issue today. To begin with, it was the biggest issue of a motor magazine ever published and the only reason the circulation was held down to 49,000 copies was because we couldn't get any more printed. And size and circulation weren't its only features, for the congratulations which have come to us indicate that our readers are just as proud of it as we are.

About this dinner picture, however. It was a strictly co-educational affair this year for the first time. Some of the gentlemen who seem to be falling fast asleep must be pardoned, for they were up all night the preceding night putting the big issue to bed. And, entrez nous, we were tickled to death that the office boys got up in the foreground of the picture, because perhaps they'll show us a little speed in return for their prominence.



Here we have a picture of the annual dinner of the Society of Automotive Engineers. The engineers held a two day meeting in connection with the Chicago show this year and their activities are more fully reported elsewhere in this issue.

Service Features, Business and Attendance Make Chicago Show Memorable

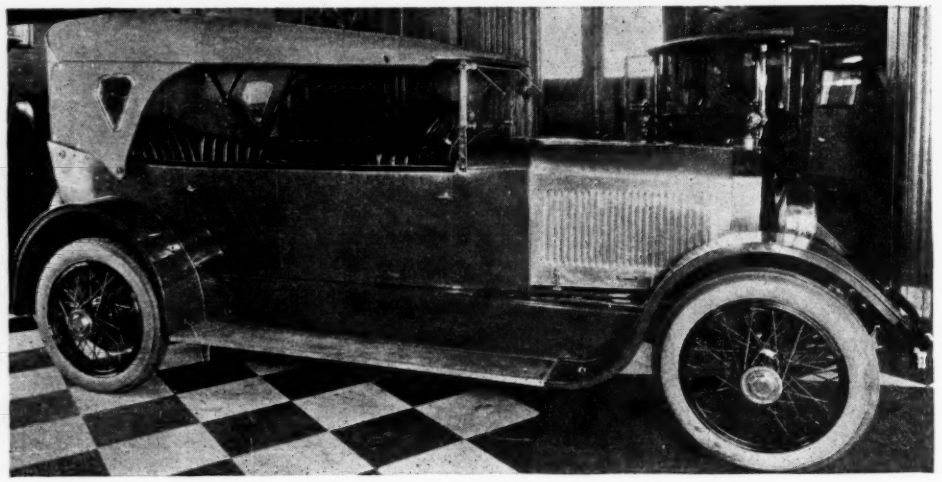
CHICAGO, Feb. 1—Chicago's twentieth annual passenger car show and first truck exhibition came to a close last night with a new attendance and business record probably set. While the exact figures on attendance will probably not be checked up for a fortnight or more, Manager S. A. Miles declared at the close of the show that it was his belief that more persons had seen the exhibits than ever before.

Dealer attendance at the show has been tremendous, even greater than in previous years. Most of the distributors in Chicago brought in as many of their dealers as possible while distributors from other cities also availed themselves of the opportunity to get together with their dealers during show week. Of course, it is impossible to arrive at exact figures in regard to the amount of business actually transacted at the show but the numerous dealer dinners and meetings indicated that this was in proportion to the increased attendance at the show.

For the most part the only direct benefit of the show itself to dealers in the Chicago district was to enable them to compile lists of "prospects" for the coming year. The exhibits at the Chicago show were directly in the hands of the factory organizations and individual buyers, for the most part, were referred to the private exhibitions staged by the distributors at their salesrooms along the row.

Get Good "Prospect Lists"

A significant phase of the show this year was the unusually large number of individual buyers who appeared. Instead of "prospects" this year, most of the individual buyers were of the "cash in hand" variety, eager to get immediate delivery of the cars that struck their fancy. Of course, these buyers were referred to the dealers in whose territory they resided and the sales will have to be handled the customary way, but their presence and their numbers showed conclusively that there is not going to be a "spring rush" this year.



The new Kenworthy touring car exhibited at the Salon

Realize the Shortage of Cars

Car buyers have at last come to the realization that the shortage about which dealers and manufacturers have been warning them for the last six months is not merely a bugbear to stimulate sales but an actuality. As a result, persons who contemplate buying cars this year are buying them now instead of waiting until later in the season. This tendency is a healthy one for the dealers, for instead of a seasonal demand, it will give them an opportunity to build up what they have always needed—a healthy, year-round demand for cars.

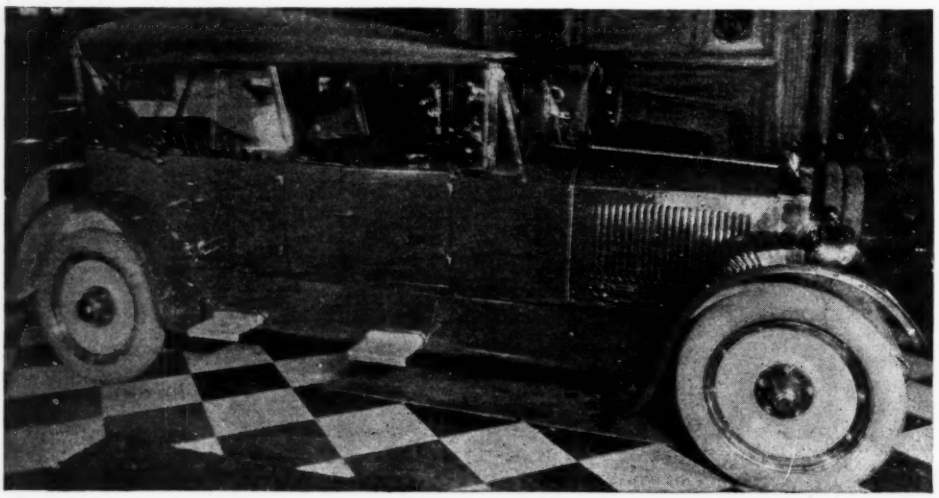
Another feature of the show was the increased attention being paid both by manufacturers and by buyers to serviceability of cars. In the last few years the automobile public has been forced to use its cars for longer periods than heretofore, that is, persons who formerly bought new models each year have been forced to hold their old models two and three seasons. This naturally has demanded more and better service work and the man who has had a car for two or three seasons and has had service work done on it in that time naturally is keener about getting a car of accessible serviceability than he was when he ran his car only one season and seldom had to send it to the service station.

Makers Take Up Serviceability

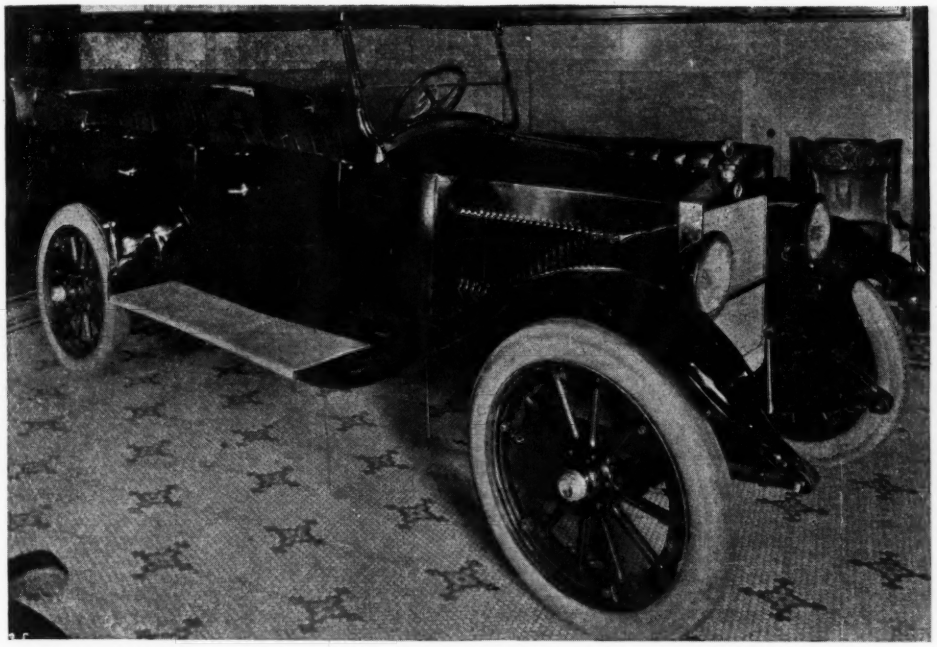
Makers have taken cognizance of this demand and scarcely any of the 1920 models but have embodied more or less important improvements in construction with this end in view. Some of the steps taken in this direction are hesitating and faltering, but nevertheless they are steps in the right direction and future shows undoubtedly will see the subject of service being given more and more attention by manufacturers.

That the Chicago show is recognized as being an event for dealers was shown by the large number of service equipment devices offered by the accessory makers. While, of course, most of the accessory exhibits were what might be termed "owner accessories," the number of those for the service station and repair shop was far greater than in previous years and showed the growing tendency toward more and better tools to handle the maintenance of cars.

The eagerness with which dealers sought agencies for cars introduced for the first time this year reflected the state of the business at present. Dealers already representing two or three well



The Shaw, a newcomer at the Automobile Salon



The Kurtz, which was exhibited at the Lexington hotel

known models who, in previous years, could scarcely be induced to take on additional lines, were eager to get new cars this year. The cause was, of course, the certainty that the demand for cars this year would be greater than the established factories can supply and this was aided by the knowledge that for the most part the new cars introduced this year are the product of men well and favorably known in the motor car industry, not the product of visionary or unscrupulous "wild-catters" as has unfortunately been the case at some previous shows.

From the standpoint of the casual spectator, this year's show was not nearly as interesting as last season's. This was due, of course, to the fact that virtually none but stock models were shown, the Packard exhibit being practically the only one in the main show which featured a special body job. This, of course, was in keeping with the character of the show which was strictly a manufacturers show, designed and held foremost to display to dealers, distributors and the trade in general, just what was to be offered for the coming year in stock models, with the general car buying public a secondary consideration in show plans.

As a consequence, in order to get glimpses of any "special cars," it was necessary for buyers to visit the individual displays of the distributors on "motor row." This was anticipated by the Chicago dealers, long accustomed to national shows, and nearly every distributor along the row had prepared special shows in his salesrooms. These special shows were of virtually the same nature as those at the Coliseum last year when the dealers ran the big exhibition themselves and were able to show their special jobs.

Only four cars were shown in Chicago during the national exhibition which had not previously been shown at New York or about which the trade had not been previously thoroughly informed. These were the Kurtz, displayed at the Lexington hotel, the Skelton, exhibited at the Sherman and the Kenworthy and Shaw, displayed at the Automobile Salon at the Congress hotel. These cars will be thoroughly described in later issues of MOTOR AGE.

The Salon was a center of interest for persons interested in special body designs but proved disappointing to persons who had an opportunity to compare the Chicago Salon with the one held at New York. There was an extremely limited number of exhibits at the Chicago show and while some of the new body designs were extremely interesting and attractive, they were, for the most part, far below the standard of special body designing shown at New York.

NEBRASKA DEALER DECAMPS

North Platte, Neb., Jan. 30—C. M. Trotter, well known motor car dealer here and president of the Chamber of Commerce, has left for parts unknown. So far claims totaling $10,000 have been filed against him and his automobile company. Many automobile purchasers out here are worried for fear the cars they bought of him during the past few months have not been paid for.

AGAIN, SHOULD GARAGES SELL CHEESE?

Los Angeles, Jan. 30—The grocery store as a distributing point for automobile tires is the most recent innovation in Los Angeles. The Rubber Products Company, through its Pacific Coast representative has made arrangements with the Ralphs Grocery Co. to act as distributors for Stronghold and Barberton tires. The Ralph company operates a chain of seven stores in Los Angeles. It is a financially strong concern and the initial order was for a larger number of tires than the customary dealer would be likely to require in a year.

Difficulty in listing dealers whose finances will bear investigation is the reason assigned by Steward Slosson, representing the Rubber Products Co. for the selection of the Ralphs Grocery Co.

"It is not that we would not like to have our lines handled by exclusive tire dealers that we have made this arrangement," said Slosson. "But it is difficut to get exclusive dealers who have enough money to keep up a stock of tires. early all of the dealers depend mostly on taking orders and getting them filled at the tire company branches in the city. They carry a few tires in stock, but these are more for display than actual sale."

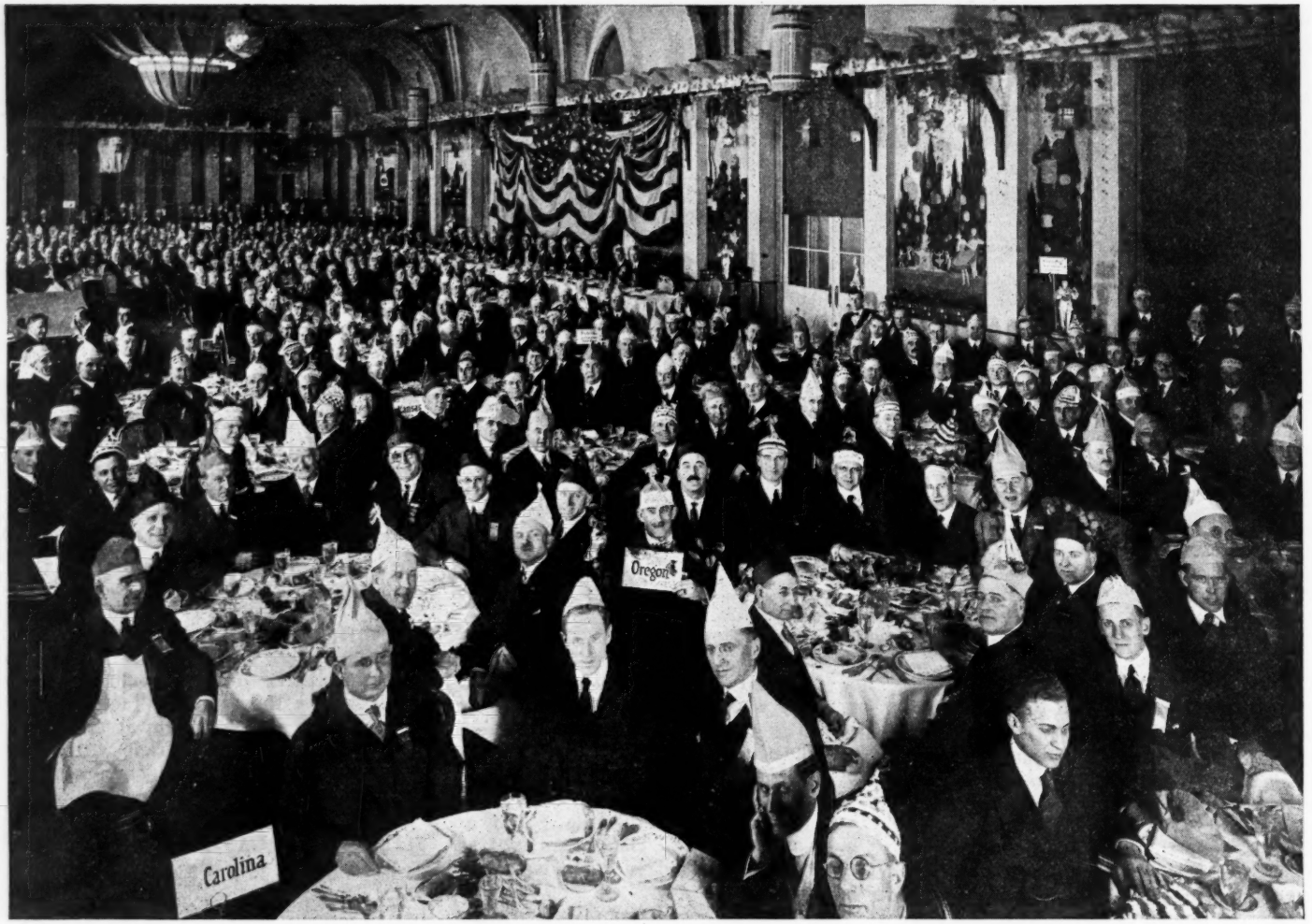
An issue that arises in connection with the transaction is that the Ralphs Grocery Co. by not being dependent exclusively upon tire sales for income and by buying in big quantities is put in position where it can retail tires at a price exclusive dealers could not. In other words, they pay the factory price for the tires and sell them at their own figures. The entire tire trade will watch developments in this connection with no little interest.

$12,000 TO ORGANIZE COAST TRACTOR MEN

Los Angeles, Jan. 30—The California Tractor and Implement Association has appropriated $12,000 for the current year for the purpose of organizing dealer associations throughout the northern part of the state and fostering local demonstrations under those dealers' associations. The association will employ a permanent secretary at an adequate salary who will organize the small associations and direct the demonstrations. The question of a demonstration in Southern California this year now is receiving consideration. It is probable that a dealers' demonstration will be held here again as for several years. With dealers in charge this means there will be no competitive tests.

FIAT BUILDS NEW SPORT CAR

New York, Jan. 30—In order to meet the requirements of clients who are interested in a fast sporting type car, the Fiat company is specializing on a special 35 hp. six-cylinder model. This is the standard chassis design lightened for high speeds and fitted with a specially designed body. The radiator is a pointed type, the bonnet forms an almost straight line with the scuttle and the body, and the hood is completely disappearing. A very pleasing effect is obtained with the pointed windscreen. There are no running boards, but there is a step for each door. The car is a four-seater, and is fitted with detachable Sankey steel wheels. This car is very smart and remarkably pleasing in appearance.



The Annual Frolic of the National Automobile Dealers' Association

N. A. D. A. Does Some Real Work at Annual Meeting

CHICAGO, Jan. 27—After two years of strenuous development work the National Automobile Dealers' association set its face forward at its annual meeting here yesterday and today and plans to go on to a big future.

Around the walls of the meeting room in the LaSalle were charts and diagrams telling of the constructive work the association has been able to do in connection with its development and outlining the plans it has for the future. A thing which will be of great value to the N. A. D. A. is its new plan of having a vice-president in every state. These men will assume direction of development activities in their states and help the trade to a higher level, which is the ambition of the N. A. D. A.

The keynote of this better business which will be a necessity in a short time, was founded by the new president, Harry B. Harper, the Overland distributor in Philadelphia, who delivered an address which was full of good business sense and seemed to make a deep impression on the audience.

The N. A. D. A. is going to investigate automobile schools in an effort to ascertain which ones are worthy of support and how schools generally can be improved. One of the most important situations today is that concerning freight cars and a telegram was sent to Director General Hines of the railroads asking him to consider measures of relief. At the present time, due to causes that are not definitely known to the N. A. D. A., it is difficult to secure freight car service in much needed directions.

State associations are to be formed as rapidly as the trade is ready. Seven states are now prepared to go ahead with this work and action will be taken at once. N. A. D. A. will still keep behind the Townsend Bill for Federal Highways, to which opposition has arisen in some sections, due, it is stated, to local politics.

The fight will still be continued against the old moonshine liquor federal statute, which is sixty years old, and which provides under its present interpretation that an automobile in which liquor is being carried may be confiscated, regardless of any equity in a car held by a dealer.

The newly organized Service Manager's Bureau is to begin operations immediately. The first step is to secure a manager, after which the service men throughout the trade will be brought together in local associations and an educational movement in this branch of the trade will be carried on. In this connection named a committee to form a standard service policy which will be laid before all members for their consideration.

NEW N. A. D. A. OFFICERS FOR 1920

President—H. B. Harper, Philadelphia.

Vice-Presidents — P. H. Greer, Los Angeles; W. G. Brace, Kansas City. (For state vice-presidents see next following page.)

Treasurer—F. W. A. Vesper, St. Louis.

Directors—One year: R. W. Powers, Providence, R. I.; J. A. Graham, Minneapolis; Thomas Botherill, Denver. Two years: G. D. McCutcheon, Atlanta; Thomas J. Hay, Chicago; C. N. Weaver, San Francisco. Three years: A. N. Mitzell, Canton, Ohio; W. A. Woods, New York; J. D. Ray, Shreveport, La.; H. D. Austin, Seattle.

N. A. D. A. State Vice-presidents

Alabama—L. J. Adams, Mobile.
Arizona—George H. Reuben, Phoenix.
Arkansas—C. G. Faulhabor, Little Rock.
California—Royal Millor, Sacramento.
Connecticut—R. D. Briton, Hartford.
Delaware—J. R. Bixby, Wilmington.
District of Columbia—R. J. Murphy, Washington.
Florida—Claude Nolan, Jacksonville.
Georgia—R. A. McCord, Macon.
Idaho—Warren Paul, Pocatello.
Illinois—H. B. Pinkerton, Peoria.
Indiana—N. H. Cartinhour, Indianapolis.
Iowa—J. R. Rude, Marshalltown.
Kansas—W. H. Imes, Topeka.
Kentucky—W. A. Thomas, Louisville.
Louisiana—George D. Wray, Shreveport.
Maine—H. A. Robinson, Ellsworth.
Maryland—Hugo Block, Baltimore.
Massachusetts—A. J. Shorey, Boston.
Michigan—Guy O. Simons, Detroit.
Minnesota—H. B. Knudson, Duluth.
Mississippi—T. J. Hines, Jackson.
Missouri—M. L. Cowden, Springfield.
Montana—A. T. Heaney, Great Falls.
Nebraska—Guy L. Smith, Omaha.
Nevada—E. D. Mack, Reno.
New Mexico—A. R. Davis, Raton.
New York—E. J. Ellis, Rochester.
North Carolina—Lindsay Fishel, Winston-Salem.
Ohio—I. Van Baalen, Youngstown.
Oklahoma—M. H. Randall, Okla. City.
Oregon—M. O. Wilkins, Portland.
Pennsylvania — George MacFarland, Harrisburg.
Rhode Island—C. H. Everett, Providence.
So. Carolina—J. B. Roddey, Columbia.
So. Dakota—C. W. Thompson, Sioux Falls.
Tennessee—Fisher Cole, Nashville.
Texas—Don Safford, Dallas.
Utah—A. G. Randall, Salt Lake City.
Virginia—J. A. Kline, Richmond.
Washington—P. E. Sands, Seattle.
West Virginia—C. F. Gilbert, Charleston.
Wisconsin—Jesse Smith, Milwaukee.
Wyoming—W. E. Dineen.

Because of the increasing number of motor car accidents and the resulting public feeling against reckless driving, the association adopted a resolution calling upon all dealers to assist the authorities in eliminating careless driving of cars.

One of the spectacular features of the convention was the dinner and frolic held Monday night attended by between 400 and 500 dealers. It was mostly a dinner and vaudeville program with no speeches. E. E. Peake of Kansas City, former executive secretary of the N. A. D. A. and president of the "show managers' association," presided.

At the first day's meeting the morning session was devoted to the organization of the convention and at the afternoon session addresses were made by Ray W. Sherman, executive editor of the Class Journal Co., and Harry B. Harper, Philadelphia, who is the new president of the N. A. D. A.

The second day's session was devoted to the discussion of various trade matters and concluded with the election of officers. Former president Vesper becomes treasurer.

The charter of the N. A. D. A. was amended at this session as follows:

Article 4, paragraph 1, was amended by striking out specific designation of membership and substituting therefore such classes as may be designated by the board of directors.

Article 5, par. 2, was so amended that hereafter a nominating committee of five will be appointed at each annual convention and no nominations outside of the report of the committee will be considered unless backed by a petition signed by twenty-five members.

Article 7, par. 1, was amended by striking out paragraph 1 and designating the officer of the association as president, first and second vice-presidents, treasurer and secretary and general manager. All executive officers, with the exception of secretary to be members of the association and elected by the association. The secretary and general manager may or may not be members of the association and both are to be appointed by the board of directors and to hold office until the appointment of his successor.

Article 5, par. 1, was amended by the substitution of ten directors instead of nine. Beginning at the meeting when the amendment was adopted directors are to be elected as follows: Three for one, three for two years and four for three years.

Article 9, part 1, was amended by the substitution of the word association for the word corporation.

In the afternoon the following papers were read:

1. "Why the Townsend Bill?"—Pyke Johnson. Mr. Johnson said that national economy was essential. The Townsend bill does not ask for additional appropriation, but does ask for an efficient, intelligent and economical administration and expenditure of the appropriations to which congress already is committed. There are 2,500,000 miles of rural road in the country. The Federal Aid Law does not prescribe what parts of this system shall be improved so that it is impossible to insure a concertive and consistent plan of developments. Furthermore, inasmuch as the money proportioned to the states is expended by state and county officials there is a lack of efficiency and economy in the administration of the fund. The law also provides that no part of the appropriation shall be spent in maintenance. Furthermore, there are no prescriptions as to road materials and thus the money can be spent on dirt and clay, with the result that there are no primary roads. These are points which justify the Townsend bill because in it all of these points are covered.

2. "The Service Manager's Job"—P. E. Chamberlain. Mr. Chamberlain's talk was given in full in last week's issue of MOTOR AGE.

3. "What We Must Do for the Trade Schools"—F. W. A. Vesper. Mr. Vesper said that too many so-called schools give only preliminary and elementary instruction and are in the business principally for the money there is in it. It is a present day job for the N. A. D. A. to impose a censorship on schools and the association work out a standard of what such schools should be. A discussion which followed showed various expedients which had been resorted to to meet the demand for competent mechanics to serve in the place of the incompetent men graduated from the poor schools. A number of speakers of note recommended the work of the Y. M. C. A. in various sections of the countries and instances were given where some of these schools really are turning out good men. Vesper suggested that in many instances lack of equipment operated as a handicap on efficiency and suggested the propriety of automobile dealers taking a personal interest in the matter of providing worthy schools with such equipments.

4. "The 1920 Way of Selling Motor Trucks"—N. H. Cartinhour. Mr. Cartinhour based his argument entirely upon service. He said that up to a certain point the sale of automobile and motor trucks paralleled. The automobile is the most important single purchase of the home, while the motor truck is the most important single purchase of the business. Therefore, if service is one of the most important things in connection with the sale of motor car, it is the predominate factor in selling the motor truck. Therefore, the 1920 way to sell motor trucks is to render the necessary service. There is trinity in unity in business. The automotive dealer must have something to sell, a place to sell and know how to sell. In selling there are two ways. One is by way of salesmen. The other is catalog. The former is preferable, but the salesman must be well informed technically regarding the product he sells. It is necessary also for the truck owner to know his cost of operation. For this reason part of the service of the dealer consists in teaching the truck owner just what he is doing with his transportation units.

5. "Future of Successful Automobile Merchandising"—J. O. Munn. Mr. Munn's talk was a brief of the talk he gave recently at Cleveland, Ohio.

180 Displays Are Carded for Detroit Motor Show

DETROIT, Jan. 31—Manager H. H. Shuart of the Detroit Automobile Dealers' Association has allotted booths for 180 separate and distinct displays at the Detroit automobile show Feb. 14 to 21. Five floors of the big Ford building in the heart of the automobile district will be utilized for the display of passenger cars, trucks, trailers, tractors and accessories.

There will be seventy makes of passenger cars, including at least five that were not ready for the New York and Chicago shows, forty-five complete lines of trucks, comprising a wide range of models and a list of accessories three times as great as ever before exhibited in Detroit. Decorations in keeping with the high character of the vehicles on display and a continuous musical program have been planned by Manager Shuart. A complete list of exhibitors follows:

Passenger Cars—Auburn, Allen, Artcraft Tops, Apperson, Buick, Briscoe, Cadillac, Cleveland, Chandler, Chevrolet, Columbia, Case, Chalmers, Cole, Detroit-Electric, Dodge Brothers, Dort, Detroit Weatherproof Bodies, Elcar, Essex, Franklin, Ford, Ford Special Bodies, Grant, Hupmobile, Hudson, Haynes, Harroun, Holmes, Jordan, Jackson, King, Lexington, Liberty, Locomobile, Milburn Electric, Monroe, Marmon, McFarlan, Maxwell, Mercer, Maibohm, Mitchell, Nash, Nelson, Oakland, Oldsmobile, Overland, Pierce-Arrow, Paige, Packard, Peerless, Raulang Electric, Revere, Reo, Studebaker, Scripps-Booth, Stanley Steam Car, Stutz, Stearns, Stephens, Templar, Velie, Winton, Willys-Knight, Westcott.

Commercial Cars—Acason, Acme, Air-O-Flex, Bethlehem, Columbia Bodies, Chevrolet, Commerce, Cleveland Tractor, Dodge Brothers, Denby, Delivery car bodies, Ford, F.W.D., Fruehauf Trailers, Federal, Garford, G. M. C., Gramm-Bernstein, Hall, International, Jackson, Kelly, Mack, Maxwell, Nash, Oldsmobile, Packard, Paige, Pierce-Arrow, Reo, Reynolds, R. & L. Industrial, Republic, Signal, Selden, Service, Standard, Transport, Universal Attachments, United, White, Wolverine, Wolverine Trailer.

Accessories—Alemite Lubricator Co., Andirx Lock Nut Co., Atlas Oil Co., Auto Electric Service Corp., Auto Manufacturers' Service Co., Automotive Engine Parts Co., Bowman-Gould Co., Champion Spark Plug Co., Class Journal Co., Continental Motors Corp., Cornfield Wheel Co., H. C. Cudworth, Cumming Bros., Curran-Detroit Radiator Co., Detroit Automobile Club, Demountable Rim Lock Co., Double Seal Ring Co., Eastern Rubber Co., Emerson Manufacturing Co., Essenkay Co., of Detroit, Erie Tire & Sales Co., Fauver-Cavanagh Co., Inc., Fisher Sales Corp., W. P. Fleming, Henry J. Furer, Garage Sales Co., Gill Piston Ring, Holcomb Steel Co., Horizontal Hydraulic Hoist Co., Interstate Sales Co., Kant-Break Spark Plug Co., Kol-Ben Wheel Co., Kummer & Reynolds, Lacey Co., L. Lawrence & Co., Locktite Patch Co., Mansfield Steel Corp., Marx Machine Tool Co., Mead Morrison Manufacturing Co., Michigan Automotive Supply Co., Michigan Mutual Liability Co., Mueller Metals Co., E. H. Murphy, National Milometer Co., National Mortgage Co., Noble Piano Co., R. O. Olson Co., Arthur J. Paige, Prather Wheel Co., Re-Miler Sales Co., S. Rosenthal, Security Tire & Rubber Co., Simplicity Wheel Co., Thompson Auto Co., Tokheim Oil Tank & Pump Co., Velie-Detroit Sales Co., Victor Rubber Co., Warner Winter Top Co., Wayne Oil Tank & Pump Co., Westinghouse Air Springs Co., Wise Electric Shererdizing Co., Frank S. Wright.

WORCESTER SHOWS 70 CARS

Worcester, Mass., Jan. 30—Never before has there been such a display of passenger automobiles exhibited in Worcester as has been exhibited this past week in the State Armory at the automobile show under the auspices of Companies A, C and H of the Massachusetts State Guard.

More than $250,000 in total value was represented by the seventy cars which represented the product of forty manufacturers. Cars ranging in selling price from the much used and appreciated Ford to the palatial $13,000 Locomobile were on display.

The machines were the same models as picked by the manufacturers for the New York auto show. Thousands of people attended the show and pronounced it the best ever held in the city.

Every dealer in the Worcester Auto Dealers' Association was represented. A musical program was presented each night of the show and different nights were set aside for certain Worcester clubs. Of the seventy cars on exhibition the following makes were represented by one or more models: Mitchell, Buick, Haynes, Liberty, Stanley Steamer, Paige, Reo, Peerless, Overland, Cadillac, Ford, Columbia, Marmon, Packard, Franklin, Scripps-Booth, Roamer, Hudson, Essex, Oakland, Dodge, Westcott, Chandler, Cleveland, Cole, Velie, Oldsmobile, Maxwell, Chalmers, Noma, Kissel, Metz, Monroe, Pierce-Arrow, Dort, Peterson, Stutz, Studebaker, Chevrolet and Locomobile.

The general committee in charge of the show included J. C. Harvey, chairman, H. J. Murch, Frank H. Kenney, R. B. Jacobs, W. R. Livingstone, F. S. Howard and Allan Davis.

Propose to Absorb M. T. C. in New Consolidated Body

NEW YORK, Feb. 2—The proposal to absorb the Motor Transport Corps in a general plan to control all forms of transportation in the United States Army, to be known as the Consolidated Transportation Corps, is brought to the attention of the members of the National Automobile Chamber of Commerce, in a bulletin issued recently.

"There is a feeling in the Motor Truck Committee and among the directors," says the bulletin, "that the Motor Transport Corps should continue its individuality instead of being made a part of the general transportation service of the Army, as provided for in the plan for a consolidated transportation corps. It has been suggested that those members who feel that the Motor Transport Corps should continue in its present form, might wish to take the matter up with their own senators and representatives.

"Among the reasons advanced for the continuation of the Corps as a separate union are the following:

"1. The Motor Transport Corps in its present form can be more efficiently operated in times of war and peace.

"2. Under the proposed form of consolidation, supply depots in times of war, could not function properly if over-burdened with supply and repair parts in connection with transportation by marine transports, and narrow gaged railways, motor transports and power transports.

"3. In design and production, the explosive engine is entirely different from any other form of motor power, and has very little in common with other forms of transportation, being considered wholly special to itself.

"4. It would be difficult to construct a single depot to handle all the repairwork which would result from a consolidated transportation corps.

"5. In the matter of repairs, it is stated that hand repairs, in the case of motor transportation, cannot be consolidated with other forms of repairs, it being done generally by individuals on the spot.

"6. Under inspection, the technique of the various modes of transportation is wholly different and requires different men.

"7. So far as training goes, the personnel proposing the motor transport corps is so radically different from that which makes up the other forms of transpor-

tation, it would not perform well if absorbed into a general transportation scheme."

CAMERON MOTORS CHANGES PLANS

New York, Jan. 31—The Cameron Motors Corp., which originally planned to build its own passenger cars and trucks, has decided to specialize on its six-cylinder air-cooled engines. These will be built for the passenger car, truck, tractor and airplane field. The interest which has been shown lately by the automotive field in general in regard to the Cameron engine was largely instrumental in the change of plans. The Cameron company is now ready to give prompt attention to factory orders irrespective of size. It is also issuing manufacturers' licenses covering all of its patents to makers that produce their own engines. A production of 25,000 3 by 4½-in. engines is now in full sway at its Shelton, Conn., plant. It is expected that by June 1 the company will be producing daily ninety engines of all sizes.

PARENTI HAS AIR-COOLED ENGINE

Buffalo, N. Y., Jan. 31—The new Parenti passenger car, made by the Parenti Motors Corp., this city, will be placed on exhibition at the Buffalo passenger car show in March. This car will be featured by its light weight and will be equipped with a 3 by 4½-in. Cameron air-cooled engine. The price of the car is $1,685. The company is planning a production of 5000 cars for 1920.

Indianapolis Dealers Plan for Future of Business

INDIANAPOLIS, Ind., Feb. 1—The Indianapolis dealers, through their trade association, have begun to get ready for the day when the dollar will be worth 100 cents. That is the way the new president, R. V. Law, expressed himself in making recommendations as to policies and plans which the local association should outline.

Mr. Law made those recommendations as the swan song of a retiring director. The speech was so good and the recommendations so well received that the members of the association re-elected him to the directorate and the directors chose him for their president in 1920, with the approval of his plans and the assurance that everybody would get together to carry them out.

In other words, the Indianapolis trade association is to be reorganized to meet the demands of the future—the future of the 100-cent dollar, the future when real sales work will have to be done, when real business men will have to direct automotive establishments. For Mr. Law pointed out that all the soft stuff of the past fifteen months would not always hold, and that the future would not always be as bright as it is now.

"There has never been a time," said Mr. Law, "when the Indianapolis Automobile Trade Association needed the close co-operation of its membership as now, and in the coming year.

"We have been proceeding the past fifteen months under very favorable conditions, and the outlook is equally as favorable the coming year. However, there will be a time when the tide will set, and in my opinion, now is the time to prepare to stem that tide. We are too much inclined to go along having in mind the conditions of last year and not think of the time when motor car production may be equal to the demand and when a dollar again becomes worth 100 cents."

The Indianapolis Automobile Trade Association will be reorganized slightly, if these recommendations are carried through, to provide for the following reforms:

First, To base the cost of a membership on the pro-rata value of the organization's assets rather than a regular stipulated amount for dues.

Second, Organize the different classes of members into divisions, truck members, accessories members, passenger car members, and the like, and to do constructive work in each class.

Third, Inaugurate a regular monthly meeting of the full membership, at which a constructive program will be held. An interchange of ideas and systems will be beneficial.

Fourth, The question of social intercourses is of prime importance. The bringing about of more friendly relations between dealers and their respective sales organizations will set up better feeling and even co-operation in many instances.

Fifth, a clearing house in the association offices for labor of all kinds used by the dealer organizations. Also, an effective credit department.

In general, Mr. Law has recommended a constructive program for the coming year and "to organize our defenses so that our members will not be stampeded at the first signs of the turn of the tide."

These recommendations generally have been commended by the membership, who feel that the organization up to this time has been rather inert, has talked about organization, etc., without doing the necessary work to bring about those benefits.

It is believed that the establishment of the divisions will put more pep into those divisional members and develop more initiative individually and collectively.

The members of the Automobile Trade Association seem to feel that the local organization should be put on a really permanent basis now, and that every opportunity be done to promote the interests of the dealers, and their organizations to a better relationship with the public.

Attendance at Philadelphia Show Sets a New Record

PHILADELPHIA, Jan. 30—Attendance at the automobile and the truck shows here is estimated officially at approximately 60,000 for both, 10,000 of which was the truck show's share. It is also estimated that nearly 90 per cent of the trucks exhibited at the show drew inquiries which may or may not be productive of results. A considerable number of models was sold.

According to custom, the Philadelphia Automobile Trade association will celebrate the holding of the shows by a "reunion dinner," at the Bellevue-Stratford Hotel, on the evening of Feb. 10. The reason for the name "reunion," is because the committee in charge has invited as guests all of the former members of the Philadelphia Automobile Trade association who have left the city to enter the trade in other centers. The dinner committee consists of the following: A. E. Maltby, chairman; W. Ross Walton, E. R. Whitney, J. P. Cranston, George B. Shearer E. J. Berlet, W. H. Metcalf, W. G. Herbert, S. Stankowitch, Jr., and L. S. Bowers.

Something novel is promised in the way of entertainment. Preparations are under way for entertaining more than two hundred.

What is billed as the "biggest meeting of the year," will be held by the Motor Truck association of Philadelphia on Wednesday evening, January 28, at 6:30 in the Hotel Adelphia. There will be addresses on topics of interest to the trade. The inauguration of the newly-elected officers will take place and the report of the Motor Truck Show Committee will be ready.

300 CARS IN SPOKANE SHOW PARADE

Spokane, Wash., Feb. 1—The Automotive show held here January 21-24 was eminently successful. Dealers are well satisfied with the interest manifested and predict a record breaking season from the sales standpoint. More than 300 cars were in line for the opening parade. Practically all the cars participating were new deliveries from the factories. A Packard with a record of 350,000 miles and trucks loaded with logs were features. At the annual banquet 700 persons were entertained in the Davenport hotel.

Educate Tractor Service

Research Engineer Says Manufacturers Are Neglecting Opportunity

Winter Schools Are Ideal for Such a Purpose, Says Prof. E. A. White

ST. LOUIS, Jan. 30—Education of the farmer and community blacksmith by agencies of the manufacturer of motor farm tractors and plows was advanced by Prof. E. A. White, a research engineer, formerly of the Illinois State Agricultural College, as a remedy for the service problem constantly confronting the dealer, in an address before the Mississippi Valley Implement Dealers' association at the Planters Hotel in St. Louis, Jan. 20, 21 and 22.

Ignorance of the mechanism of a tractor and its appendages utilized in soil cultivation were declared by Prof. White to offer the fertile field for innumerable troubles to the dealer who must guarantee service to his customers.

Winter Schools Urged

"The dealer in implements and tractors is at present complaining of the low discounts offered him by the manufacturer. He is in a great way justified in his discontent because of the ever-increasing problems he is compelled to meet," Prof. White said. "It is incumbent upon the manufacturer to assist him and make the business a profitable one for the dealer. With this in view, the manufacturer in my opinion should establish schools during the winter months when soil production is at its lowest to educate the farmer on the various parts of the tractor and its mechanisms, so that many of the minor detail and defects may be attended to by himself instead of taking the time and interest of the dealer in his community.

"We are now entering upon a period of mechanical motor power in all industry, including the field of agriculture. The tractor of today which is in operation on our farms is used for the greater part for plowing. At least 75 per cent of them are, and in this way they form the backbone of the implement industry. The plowman of today depends greatly on the automotive power and therefore as a result he is not the same plowman his father and grandfather was. The man who sits at the wheel knows less about plowing than the man who held both handles in his hands and walked behind. Without much comparative expense and with an appreciable reduction in service, which in itself will add to the sales powers of the dealer, the manufacturer can well afford to introduce this system of teaching. It is the means to the great end of efficiency and will create satisfaction on the part of the dealer."

Prof. White stated that the blacksmith who knew how to properly sharpen a plow was an asset to his community. He relieved the responsibility of the farmer and the dealers, in that, by proper sharpening, the wear-and-tear on the tractor was noticeably reduced.

"Efficient hitching of the plow to the tractor means much in the life of the power generator, and lessens the trips to the dealer for additional repairs. I would advise that the weight of the plow be kept evenly balanced on all three, or two wheels, as the number may be. Uneven distribution of gravity tends toward manifold abuse. Keep the hitches high and at a distance from the tractor."

Speed Must Be Worked Out

In discoursing on the speed to be obtained with tractors, Prof. White declared that three or four miles an hour was sufficient for good pulverizing of the soil. "The speed as it may be in the future is unlimited. Tractors will make 8 or 10 miles an hour and accomplish their task efficiently. Manufacturers should make their plows so that they can do the work correctly at an increase in speed.

"What a tractor with an increased speed will do for the cultivator of the soil is incommensurate with the effort put into the creation of new style plows that can be adjusted to the speed. Increased speed means that the soil is adequately pulverized, scouring troubles are brought to a minimum, and trash is covered better.

The design of tractors, Prof. White asserted, must be such that uneven furrows of the plow shares will be totally avoided. Greater speed, he said, would tend to eradicate such inefficiencies, but tractor wheels that track down the soil after the furrow has been made should be rearranged.

Resolutions authorizing the incorporation of the association under the laws of Missouri and endorsing further education of the farmer by the manufacturers and distributors of motor tractors were adopted at the closing session of the convention. The annual election of officers came during the business meeting, Jan. 22, and resulted in the naming of the following men for the 1920 term of office:

Henry F. Woerther, president; Frederick P. Watson, chairman of the board of directors; Frank E. Goodwin, secretary-treasurer. Vice-presidents named were: Arkansas: Hamp Williams; Alabama: S. E. Stewart; Illinois: E. A. Kahl; Louisiana: Max Thieme; Georgia: B. C. Reid; Mississippi: G. A. Wade; Missouri: T. W. Whitton; Oklahoma: B. E. De Hart; Tennessee: W. H. Edenton. The directors named for one year are: L. C. Glover and George Schneider. Those for two years are J. E. Seaman and Oscar Grannemann.

Forty-four farm implement producing firms were hosts to the visitors during the three days of the convention. Sixty-five new members were added to the association during the three days.

Stock Cars at Targa Florio

Only Companies Which Can Show Production of 100 Machines Allowed to Enter

Citroen Plans to Enter a Full Team, —Preparations Being Made to Handle Crowds

PARIS, Jan. 17—Stock cars only will be admitted in the next Targa Florio race to be held on the Island of Sicily June 20. As a proof that the machine is a regular production job, it will be exacted that 100 cars have been delivered or are in course of construction on the day of the race. While no radical change will be permitted, it will be allowed to change the rake of steering gears, to fit a special gasoline tank, wheels and shock absorbers. In the engine the camshaft, the pistons and the compression can be altered, but the same material must be used for the competition cars as for the stock models.

The race will probably be for three laps of the course used last year, the distance being 268 miles. Although the road surface will be improved, it is not expected that it will be first-class, and naturally the gradients and innumerable turns will not be modified. The course is admitted to be one of the most difficult in Europe. There probably will be six classes, according to cylindrical capacity, the smallest being 9 cu. in. from this the classes will rise by stages of 30 cu. in.

It is understood that a full team of Citroen cars will be entered for this race. This will be the first time these cars have been seen in any public competition. Arrangements have been made to charter a steamer specially to carry the competing cars from Marseilles to Palermo, Sicily. The steamer will call at Genoa to pick up the Italian competitors. There will be a special train with sleepers which will run from Paris to the grandstands erected on the course. The journey will occupy three days.

THREE NEW ENTRIES FOR LOS ANGELES RACE

Los Angeles, Jan. 30—Three additional entries for the 250-mile race Feb. 21, the first on the new board speedway now under construction here have been received. They are Tommy Milton, Ralph Mulford and Reeves Dutton. Milton has declared his intention of using the famous eight-cylinder car in which he established his records. This brings the entry list up to seven. The purse will be $25,000.

The new speedway will be one and one-quarter miles to the lap and represent an investment of half a million dollars. There will be seven miles of seats in the grandstand. With the passing of Cincinnati and Sheepshead Bay this will be the only board speedway of corresponding size and importance in the country.

Defines Taxes on Cars

Government Gives Definite Ratings on Machines Used in Transit

Merchandise Transport Taxable Only When in Rail or Waterway Competition

WASHINGTON, Jan. 31—Interpretations of the taxes on transportation by automobiles and motor trucks have been made by the Internal Revenue Bureau of the Treasury Department. Transportation of merchandise by motor trucks is taxable only when it is in competition with carriers of property by rail or water or mechanical motor transportation by rail or water regardless of other competition. For example, the transportation of freight by automobile trucks is taxable only when it is in competition with carriers by rail or water, but transportation by a motor driven boat or motor propelled rail facilities are taxable whether competition exists or not. When property is transported between two points by automobile and rail or water transportation is furnished between these same points, competition is deemed to exist. Transportation of household goods by motor trucks is regarded as transportation of property by freight and if it is conducted in competition with transportation by rail or water, it is subject to transportation tax. When the amounts charged for transportation by automobile vans include the service of packing and unpacking furniture, carrying goods up and down stairs, moving pianos, safes, etc. out of windows, the tax will be applied to the entire charge made for the service, unless the amounts can be itemized and apportioned, then the tax applies only to actual transportation charge.

When a motor truck is chartered and the person chartering the truck transports his own property on it, the amount paid for chartering the truck is not regarded as a transportation charge subject to tax, but payments for the rental or chartering of a truck operated by the owner of the truck or his employees, are subject to the transportation tax.

Transportation by express by motor truck is not taxable unless it is in competition with express transportation by rail or water. The express tax would be applied dependent upon the character of, and the conditions under which such services are rendered is distinguished from transportation of property by freight. Express business is defined as made up with regularity and fixity of route, greater care and speedier delivery than with freight. The charge of a greater price on account of special service would be evidence that the property hauled is being hauled by express service. The Government recognizes that special provisions may exist in the distinction between express and freight and suggests that special cases should be submitted to the Commissioner of Internal Revenue for determination.

The hauling of baggage by motor trucks which do not transport other parcels or packages is not regarded as a business of transporting by express. Parcel delivery drayage companies engaged in city delivery or ordinary local hauling, are not in the express business and are not subject to the express tax. The tax on transportation of property by freight is 3 per cent of the amount paid for the transportation. The tax on transportation of packages, parcels or shipment by express is 1 cent for each 20 cents or fraction thereof of the amount paid for the transportation of the express packages. No tax applies to any payment for freight amounting to 16 cents or less.

B. M. IKERT MOTOR AGE EDITOR

B. M. Ikert has been appointed Editor for Motor Age to succeed the late Darwin S. Hatch, who was Managing Editor until his death a fortnight ago.

Mr. Ikert has been associated with Motor Age for three years, acting as Technical Editor under Mr. Hatch. He has had considerable practical experience in automobile service work and in business journalism.

WASHINGTON TRADE MEN MEET

Washington, Jan. 30—The Washington Automotive Trade Association held its first annual banquet here last night at which time addresses were made by A. G. Bachelder, Chairman of the Executive Board of the American Automobile Association, Pyke Johnson, Secretary of the Highway Commission of the National Automobile Chamber of Commerce and others. The banquet was followed by election of officers as follows: Rudolph Jose, President; C. R. Hough, Vice President; C. H. Warrington, Secretary, and E. J. Quinn, Treasurer.

OHIO DEALERS TO FIGHT DISHONEST REPAIRS

Columbus, Ohio, Jan. 31—The Columbus Auto Trade Association is going after dishonest garagemen and repairman in a practical manner. Beginning with the first of the year the association inaugurated a bureau to guarantee honest service to owners. After that date the work of all of the members of the association is guaranteed. If an owner believes he has been overcharged and upon complaint to the association, a thorough investigation of the case is made and if it is found that the owner has been overcharged, the association will reimburse the motorist and the membership of the garage or repair shop making the overcharge will be cancelled. If the complaint is without foundation, the evidence will be presented to the owners. All members of the association will be furnished with an emblem of the Ohio Automobile Trade Association, which they are asked to display in a prominent manner.

Service Talks Scheduled

New York Association Plans a Long List of Lectures by Prominent Speakers

"Routing a Job Through The Service Station" is First of Winter Series

NEW YORK, Feb. 1—A comprehensive series of lectures dealing with various problems of service station work has been scheduled by the Automotive Service Association of New York. The first of these talks, "Routing a Job Through the Service Station" is to be delivered Feb. 3 at the National Automobile Chamber of Commerce, New York, by Henry M. Holt, service manager of the Willys-Overland Co. Following are some of the other lectures which have been arranged, the dates for which are to be announced later:

"Selling Service"—Ernest V. Derks, Service Manager, Buick Motor Co. of New York.

"All About Battery Service"—C. N. Rollings, F. S. Gassoway, Inc.

"Accounting As An Asset to Service"—W. A. Evans, formerly general service manager, Packard Long Island plant.

"Specializing Mechanics"—Frank J. Lowe, Service Manager, Bronx County Auto Co.

"Claims and Adjustments"—Col. James Florida, "The man who put Packard service across in Philadelphia."

"Classification and Development of Craftsmen," Ralph C. Rognon, president, Automotive Service Association of New York.

"What Service Means to the Dealer"—Ray W. Sherman, Supervising Editor, Class Journal Co.

"Can the Apprentice System Be Revised?"—J. H. Lange, Three Point Truck Co.

"Charting Your Bookkeeping"—Henry L. Ferris, service manager, Autocar Sales & Service Co.

"Service Salesmanship"—W. A. Evans, formerly general service manager, Packard Long Island plant.

OFFER TRANSPORT ENGINEERING COURSE

New York, Feb. 2—A course in Motor Transportation Engineering, the first of its kind to be given by any university in connection with industrial study, is to be added to the curriculum of New York University, beginning next month. The new course will be given by F. Van Z. Lane, chief transportation engineer of the Packard Motor Car Co., Detroit, and will be open to students in mechanical and civil engineering who are specializing in highway work. The motor truck will be studied as a mechanical unit in industry, rather than from the standpoint of truck design.

Louisiana to Build Seven Trunk Lines Through State

BATON ROUGE, LA., Feb. 2—The state of Louisiana, through its State Highway Department, of which Duncan Buie is chief, is at work today on the construction of seven main trunk highways, all of which cross the state, either north and south or east and west, and all of which connect not only with the various parish roads of the state, but with the great transcontinental highways, north and south and east and west through the state and around its borders.

These seven great highways have a total length, within the state, of 1375 miles, of which 547 miles have been completed, 344 now under construction; 63 miles advertised for bids; 300 miles surveyed and being platted, and 60 miles being surveyed, leaving only 61 miles on which nothing has been done toward construction in the near future. These main trunk lines passing through Louisiana are:

Seven Trails Planned

1—The Spanish Trail, or Southern National Highway, entering the state from Texas, near Lake Charles, La., and extending easterly through Jennings, Crowley, Lafayette, New Iberia, Houma, Slidell and Pearl River into Mississippi. This road, nationally speaking, runs from Jacksonville, Fla., to San Diego, California.

2—The Jackson Highway, which enters the state from Mississippi, via Pearl River and Bay St. Louis and runs through Chef Menteur and along the Lakes Pontchartrain and Borgne to end at New Orleans. The northern terminus of this highway is at Buffalo, N. Y.

3—The Jefferson Highway, entering the state near Shreveport, 300 miles north of New Orleans, and extending southeasterly through Mansfield, Natchitoches, Alexandria, Melville and Baton Rouge to its southern terminus at New Orleans. The northern terminal of this highway is at Winnipeg, Manitoba, Canada.

4—The Dixie Overland Highway, or that part of it which extends across the northern section of Louisiana, through Shreveport, Arcadia, Ruston, Monroe, Rayville, Tallulah, and Delta.

5—The Pelican Highway, extending from Lake Charles northeasterly through Oberlin, Alexandria, Camp Beauregard, Columbia and Monroe and ending at the Louisiana-Arkansas state line.

6—The Ozark Cutoff, beginning at the Arkansas line and extending southerly through Lake Providence, Tallulah, St. Joseph and Vidalia, thence to Natchez and across a corner of the state of Mississippi back into Louisiana to St. Francisville and on to connect with the Jefferson Highway at Baton Rouge.

7—The Mississippi Highway, beginning at New Orleans and extending northerly through Hammond and Amite to the Louisiana-Mississippi line, where it connects with the model highway extending through Brookhaven to Jackson, Miss.

Traverse Populated Districts

Extending across the state in various directions, these highways traverse the most productive and most densely populated sections. They connect the six largest cities of Louisiana and make the capital, Baton Rouge, and the chief port, New Orleans, easily accessible from all parts of the state. They extend through 75 per cent of the state's 63 parishes, and in this 75 per cent are contained 89 per cent of the state's assessed valuation and 93 per cent of its population.

POWDER BLAST STARTS ENGINE OF AUTOMOBILE

Jan. 30—The explosion of the Du Pont powder mill in Uniontown, Pa., recently, pulled a strange prank. At the home of Attorney H. K. MacQuarrie, in South Uniontown, the entire family was awakened when the powder mill let go and the sound of shattered glass told a story of broken windows as the reverbations of the jolt died away. Then a strange noise was heard. It sounded like the buzzing of a billion bees. Dressing quickly and hurrying out to his garage Mr. MacQuarrie found the engine of his automobile had started and was humming merrily. This proved to be the most novel vagary turned up in the explosion aftermath.

All the culverts, bridges and other drainage structures on these highways are being constructed of reinforced concrete. The surfacing is either sand-clay gravel, washed gravel, or a mixture of the two. The regrettable part of this road construction is the use of these materials, which require constant maintenance and practical reconstruction every few years, but Louisiana road-building has not yet progressed to the point of broken stone foundation and concrete surfacing, without which no permanent road can be maintained all the year round in the South. The mixed sand-clay gravel and washed gravel, however, has one merit, in that it settles and packs well, and may, at some future date, form a good foundation for real hard-surfaced roads.

MISSISSIPPIANS AFTER BIG BOND ISSUE

Jackson, Miss., Feb. 1—Local willingness of a majority of the counties of Mississippi to put real money into the construction of good roads augurs well for the $25,000,000 bond issue which is to be asked of the present session of the state legislature for the building and maintenance of a state-wide system of highways which shall be supervised by the state, rather than by the separate counties. While Mississippi has learned from Louisiana that money put into separate links of state-wide roads by the various parishes or counties, is virtually frittered away without accomplishing permanent good, the counties of Mississippi nevertheless are going ahead at a rapid rate in the construction of their own road projects, pending the general bond issue, and these county roads are proving powerful object lessons to the voters on the value of a state-wide, state-owned and state-maintained system.

Lamar county has just sold $295,000 in good road bonds at a premium, and $100,000 of this will be spent on the Jackson Highway, which is to connect Buffalo, N. Y., with New Orleans, through Meridian and Jackson, Miss. To this $100,000, the federal government will put a like sum on this piece of road-build-Lamar county alone. Senatobia county is constructing $500,000 worth of improved highways, including twelve miles of the Memphis-New Orleans road, for which government aid has been obtained. Simpson county, through the sale of bonds, now has $200,000 available for the construction of hard-surfaced highways in its southwestern road district. One district in Holmes county has voted $70,000 in road bonds in addition to about $250,000 of other similar issues already authorized.

ROAD BUILDERS TO MEET

New York, Jan. 31—The Seventeenth Annual Convention of the American Road Builders' Association will be held in connection with the Tenth Annual Good Roads Congress and the Eleventh Annual Good Roads Show, at the Jefferson County Armory, Louisville, Ky., Feb. 9 to 13 inclusive. The armory has over 50,000 sq. ft. of space which will be devoted to exhibits. The convention will be held in the assembly hall on an upper floor.

An instructive feature will be exhibits of road machinery and materials. Every kind of appliance and device for labor saving and better production results will be shown. Included in the program of the congress is a committee report on "What Part of the Total Cost of Highway Construction and Maintenance Should the Motor Vehicle Be Expected to Bear?"

HERE'S REAL NEW IDEA

Boston, Jan. 30—Compulsory education in safety as a means of lessening motor accidents through knowledge of preventative methods is sought in a bill filed in the Massachusetts legislature by the Automobile Legal Association. According to the bill the State Board of Education would be required to prepare for use in the schools textbooks dealing with the subject of accidents on the highways, giving full details of how to be careful, etc., so that the children would get these lessons as part of their training.

W. A. Thibodeau, general counsel for the A. L. A., says that it is necessary to train people against accidents as it is to give exercises; to have doctors and nurses examine children for defective eyes, teeth, etc., and if some places like Brookline can make it mandatory that no child can graduate from a school in that town without learning to swim there is no reason why children should not know the dangers of running wild on streets and highways. By getting these lessons when young they would instinctively follow them out as they grew older, and in this way many children would be saved from injury and death, with consequent unhappiness and grief to their parents.

TO LICENSE LOS ANGELES CHAUFFEURS

Los Angeles, Jan. 30—Chauffeurs operating taxicabs and other for-hire vehicles in Los Angeles hereafter will be required to convince the board of public utilities and the police commission that they possess 30 days' experience in driving on the city's busy and congested streets. The city council has adopted an ordinance requiring this qualification. However, the council has not seen fit to make private operators show their fitness for the same kind of driving. Cripples, deaf, partially blind and other defectives drive cars daily in Los Angeles without official intervention.

UPHOLD OHIO TAX LAWS

Columbus, Jan. 30—Holding in effect that the provisions of the recently enacted graduated automobile tax in Ohio does not exceed privileges automobilists derive from the use of the highways, and that if it so desired the legislature could go back to the old tollgate idea, Judge Kinkead in the Franklin County Courts has held the recently enacted law constitutional. The action to have the law declared unconstitutional was fostered by the Ohio Automobile Association and dozens of automobile clubs throughout the state. The action will probably be taken to a higher court for decision.

The provision that saved the present graduated law from being held unconstitutional according to the court was that of having all of the monies derived from the tax applied for the repair and maintenance of highways. In 1913 a similar law was passed but as the fund derived from its enforcement went into the general fund, the same judge held the law to be unconstitutional. The law provides that 50 per cent of the funds is to go into the state repair fund and the remainder into the repair fund of the taxing district, usually the county.

OVERLAND PRICES GO UP

New York, Jan. 30—Price increases ranging from $100 to $240 are announced by the Willys-Overland Inc., Toledo. Following are the new prices: Willys Knight touring, $1,975; Willys Knight sedan or coupe, $2,950; Overland Four, touring or roadster, $945; Overland Four, sedan wire wheels, $1,575.

Oregon Votes $10,000,000 More for Good Roads Construction

PORTLAND, Ore., Jan. 30—Another $10,000,000 in highway bonds, making a total for this state of approximately $28,000,000, was voted by the Oregon legislature at a special session just ended. The new bond issue is contingent on approval by the voters at the primary election in May of an amendment to the constitution, submitted by the legislature, increasing the limit of bonded indebtedness for road purposes from 2 to 4 per cent of the assessed valuation of property in the state.

The new $10,000,000 bond issue is to be used in carrying out the state highway programme, particularly in completing the paving of the Pacific and Columbia highways. Already road work involving approximately $21,000,000, including Federal aid funds, is under way in Oregon. This work includes the complete rebuilding and hard surfacing of the Pacific highway, 352 miles long, extending from the California to the Washington boundary, and the extension in both directions of the famous scenic Columbia river highway for several hundred miles.

The special legislative session also passed a law requiring that all persons who drive motor cars or trucks must take out state licenses, which are revocable by the secretary of state when the holder is deemed guilty of reckless driving. The cost of a license to the driver will be 25 cents a year.

The legislature failed to amend Oregon's peculiar gasoline test law, which requires that all gasoline sold in the state shall conform to a 56 Baume gravity test. As this requires a special grade of gasoline, California, Washington and other coast states, requiring only the government specifications for gasoline without reference to gravity, Oregon motorists have to pay 1½ cents per gallon more for their gasoline than in adjoining states.

A determined effort was made to get the legislature to amend this law to remove the gravity requirements. The amending act got through the house, but lost in the senate by one vote, so Oregon motorists for another year at least are stung for 1½ cents per gallon more for gasoline than in other states.

We Humbly Apologize

Calamitous Error Made; Glory Denied Old Oregon

SOMEBODY made a mistake.

If you don't believe it take a look at page 24 in the issue of January of Motor Age, published in Chicago.

What will you see?

Just this—

Under a heading "Along the Columbia River Highway" are three cuts. One of the eastern approach to Crown point; one of Latourelle bridge and one of Oneonta tunnel. There is no story with them, but below them it says:

"The New Columbia River highway in WASHINGTON."

Either Motor Age has its wires crossed and made a mistake which should never have been allowed or somebody deceived it.

For the benefit of Motor Age it may be stated the Columbia River highway is entirely in the state of Oregon.

Some time ago Motor Age published a set of photographs of the Columbia River Highway and erroneously stated that the road lay through Washington. Since then out attention has been called to the error firmly and sometimes gently just 1,342,698 times, according to our veracious stenographer's latest official count. So we humbly apologize and wish it made clear that the Columbia River Highway is in

Oregon

In order to vote the additional $10,000,000 in bonds, it was necessary for the legislature to submit the constitutional amendment, for $18,000,000 in road bonds already issued have almost reached the 2 per cent limit. The new bond issue carries an emergency clause making it effective as soon as the people ratify the 4 per cent amendment.

SOUTHERN ROADS SUFFER FROM RAILROAD TARIFFS ON GRAVEL

Baton Rouge, La., Feb. 1—The building program for good roads throughout the South and especially in Louisiana, will receive a heavy jolt from the United States Railroad Administration Jan. 1, unless the federal government can be prevailed on to continue the present tariffs on the transportation of gravel. Early in 1919, the Railroad Administration issued Circular No. 9, providing for a reduction of ten cents a ton on gravel consigned to government, state, parish, county or municipal officials. This order expires Jan. 1, and the rates in force then will automaticaly advance ten cents a ton, or about 15 cents a cubic yard. W. M. Barrow, assistant attorney-general of the state, started action Dec. 20 with the Railroad Administration, looking to having the present gravel rate continued. The state highway department, as well as every state and parish road organization, the Louisiana-Mississippi Automotive Trades Association and the Motor League of Louisiana are backing the movement with letters to the administration.

This is not a California bungalow, but the home of the Federal Truck Co., St. Louis, Mo.

Verbal Orders Don't Go

This Is the Slogan Used by the Federal Truck Co., St. Louis, Mo., in Its Service Work—A Good Card Index System Also Helps This Concern

CRASH! A 3½-ton truck loaded with goods is lying on its side in a ditch ten miles from the city. Nearby is a farm house with a telephone. Three hours later the truck is in the repair shop while a substitute truck is speeding along the highway with the spilled cargo.

Magic? No, merely the Federal System. And system with the Federal Truck Co. of St. Louis is more than mere mechanical efficiency. Dozens of incidents like the above could not be possible except for the combination of loyalty from employes and attention to the minutest details by department heads and officials which has characterized the establishment and development of the service and repair departments of the company.

The Federal Truck Co. was organized in 1912 and at first occupied a small store and garage at Twelfth and Chestnut streets. The business soon outgrew these quarters and four years ago the company moved to its new modern plant at 3615 Forest Park boulevard. The business of the service department of the company grew from one truck a month to more than 300 a year and the sales of trucks have increased in the same proportion.

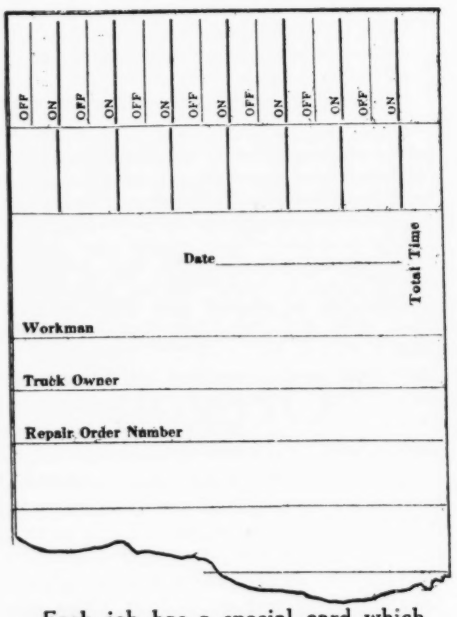
Errors Guarded Against

The secret of the Federal's success is in great part due to the sagacity and aggressiveness of its president, Allen Baker, who has consistently adopted every new progressive idea and when they did not come fast enough to suit him has invented a few himself.

J. M. Smith, superintendent of the repair department, explained to a representative for MOTOR AGE how the repair system of the company works out. Every chance of error or its twin brother misunderstanding is as carefully guarded against as is possible in modern business firms.

To begin with there is a standing maxim at the Federal plant that "Verbal Orders Don't Go." Any repair work, no matter how trivial, calls for a written statement. For every mechanic or helper who works on the damaged car the timekeeper has a separate card giving the amount of time taken to make the repairs and other data in connection with the work.

This information is filed away as carefully as any government report is pigeonholed in Washington. Red tape? Well, maybe it is but the Federal people have at their finger's ends the "dope" on any car which is brought into their shop for a second time. By a few minutes' perusal of the record much valuable time can be saved.



Each job has a special card which makes it easy to determine labor costs

When a car is brought into the Federal plant to be repaired the floor inspector first diagnoses the ills of the patient and then outlines the remedy on the repair order which is made out by the timekeeper. A heavy cardboard repair card with a celluloid face so as to prevent permanent soiling of the card by grime and oil is attached to the car which is then run into the repair shop.

Time Card for Each Job

All operations on the car are punched on a time card which the man who does the work is not allowed to punch. An employe may do precisely the same work on three or four trucks but this "time" is not summed up on one card bearing his name. For each job there is a special card. This enables the company to determine exactly how much the labor costs are on each piece of work turned out.

At the left is a copy of one of the company's time cards.

On another page is a copy of an "internal requisition" which is made out whenever welding or machine shop work is required. This card is also made out by the timekeeper to be presented to the foreman of that department who is thereby given a check on the amount of work his department turns out and its cost in material and labor.

The Federal Truck Co. maintains a completely equipped wrecking car which is regarded as able to cope with all emergencies from that of extricating a man caught under a car to putting on a new wheel. Truck wheels, radiators and

magnetos are at hand also and a portable stand is carried so that all parts of the wreckage are kept separate from other automobile parts. This alone has been a great time saver as any garage man who has spent weary minutes looking for some particular nut or utensil while an impatient customer waited and swore "never again."

In the "time room" of the plant an index of all trucks sold by the company with attendant data such as number, chassis model, etc., is kept at hand in a large filing case while another large case is devoted to indexing each "job." The repair work is listed by numbers—not by name in the department for obvious reasons. There also are duplicate stock room cards on file in the "time room."

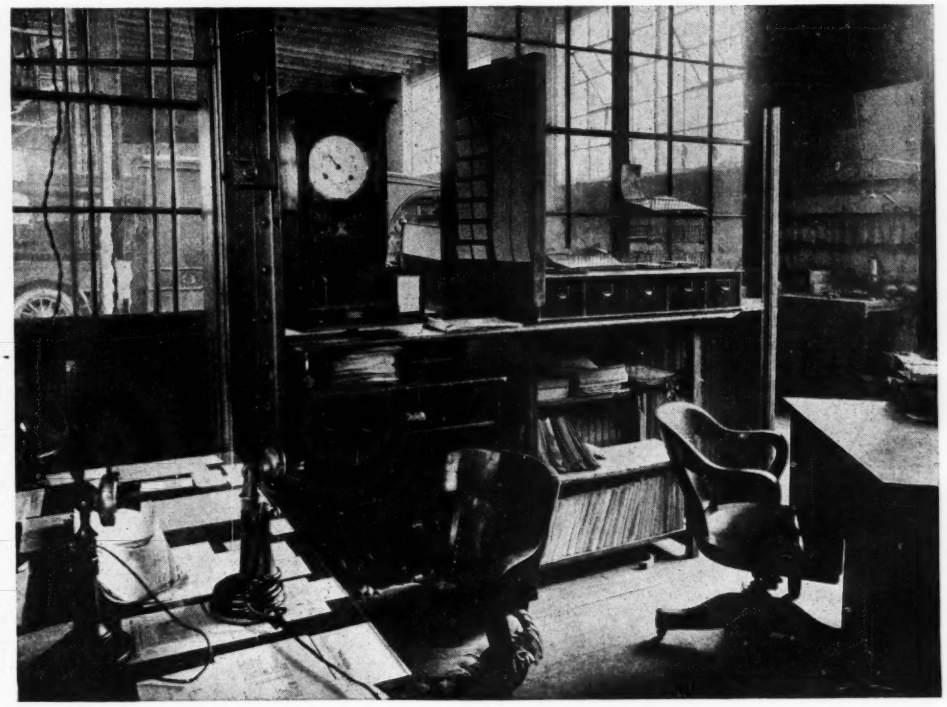
Make Record Repair Service

The repair car contains a "dolly" capable of towing the largest truck made; tow chains, reinforced planks, swivel searchlights, railroad car jacks, extra skid-chains, blocks and tackles, etc., designed to meet every possible emergency. The company is constantly seeking new ways of improving its repair service and points with justifiable pride to the following achievements as examples of what the department can do:

The repair car accompanied by a substitute truck went ten miles into the country to tow in a three and one-half ton truck which had been turned over on its side in a ditch. The truck was set back on the road and taken to the repair shop (a total trip of twenty miles for the repair car) in a little less than 3½ hours. The frame was badly bent and this was straightened the following day without dismantling the truck.

On another car with a broken propeller shaft the repairs were made within two hours including the time necessary to tow the car to the plant.

In its stock room the company carries a complete line of truck parts and a complete assortment of S. A. E. and Standard caps, screws, nuts, bolts, rivets, etc., of all sizes. This, coupled with the fact that the plant has its own welding machines, saves lots of time. In many shops machine and welding jobs have to be sent out which takes additional time and makes the customer pay for the extra costs.



Here is shown the timekeeper's room of the St. Louis Federal Truck Co., and shows the rack for the card index system

The company uses a case hardening furnace, four welding outfits, one in the main room used exclusively for straightening machines.

The machine shop is one of the parts of the plant to which the company has devoted special attention. Its dimensions are 50 by 40 ft. and by a careful grouping and conservative use of space the department is able to take care of all of its business without delay or confusion. One of the features of this room is a marte reaming bar for reaming bearings, connecting rods and motors.

The shop also has a milling machine, two drill presses, a small five pound lathe, one large 18-in. lathe, one large 16-in. lathe with a taper attachment, one 24 in. combined lathe and cylinder grinder, one 21 in. shaper, one universal grinder and one power hack saw.

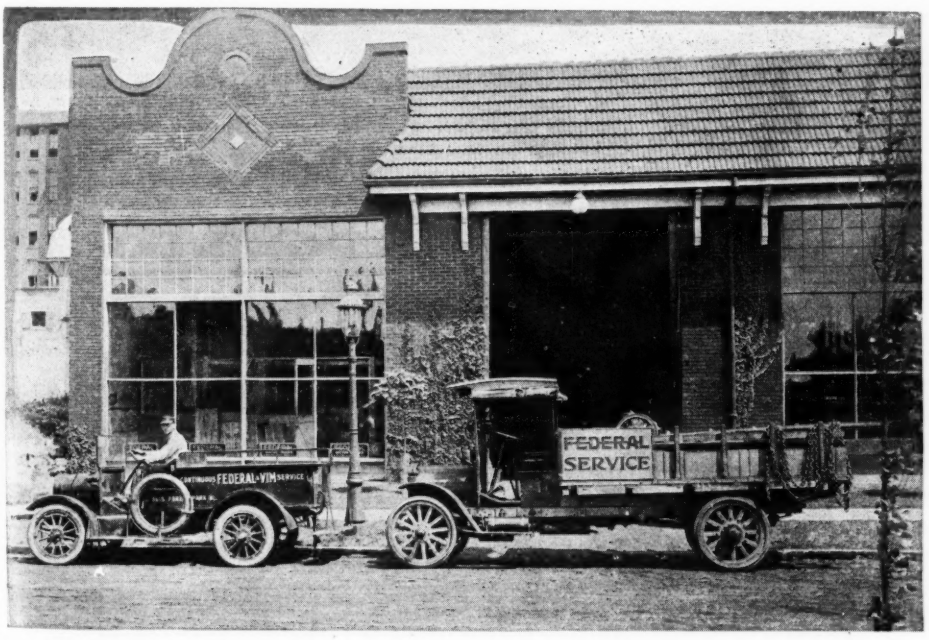
On the second floor of the plant is the engine room which is equipped with portable engine stands. In fact, portable stands are used throughout the plant wherever possible to save time and waste of energy in carrying materials from one part of the shop to the other.

The engine room is equipped with double benches and double sets of drawers to hold the engine parts. One of the conveniences in this department is an air compressor which supplies air for blowing the dirt off the engines.

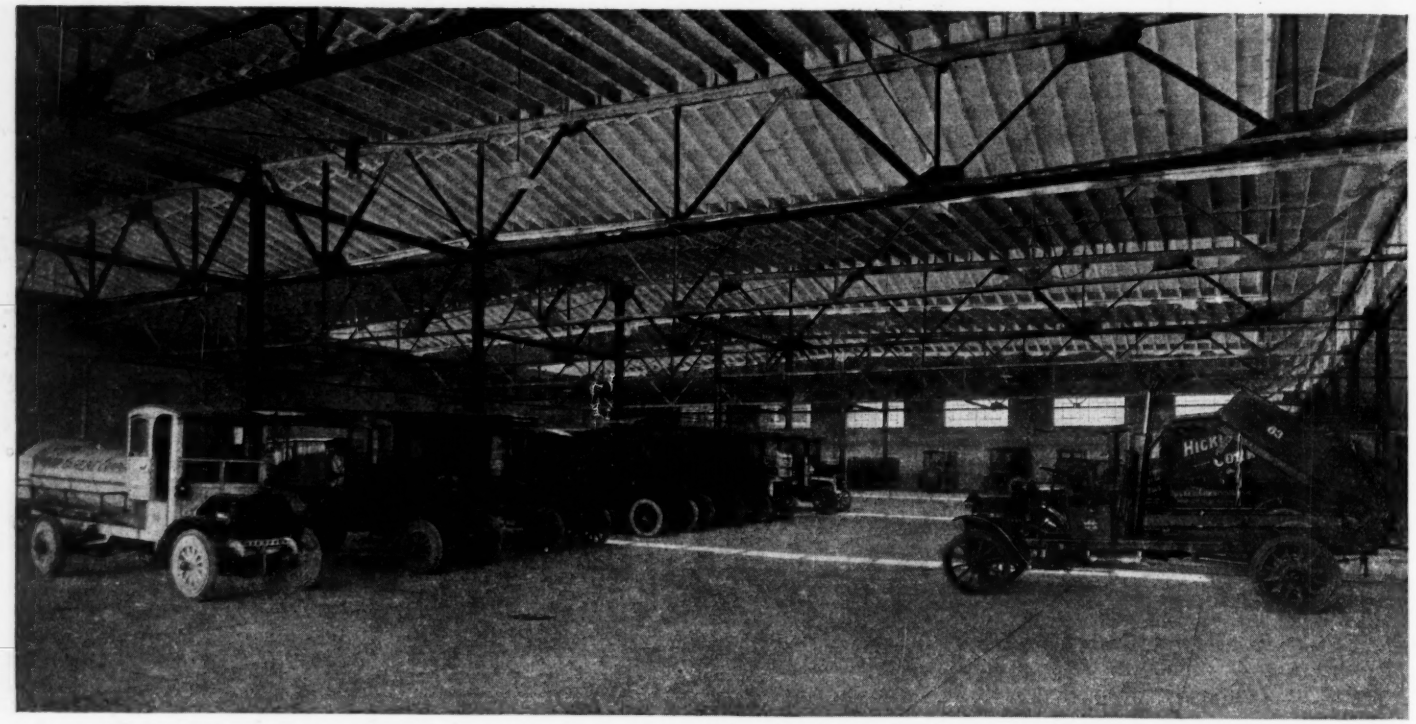
Nothing Is Wasted

The company also maintains a large salvage department where all car parts which cannot be immediately used are kept. Nothing is allowed to go to waste that can be of future use.

On the first floor at one end of the main repair room is a 250-ton hydraulic tire press. Another novel time saving feature is an automatic door opener controlled from the stockroom and which opens the 16 by 12 ft. door at the front of the plant, allowing the largest trucks to be driven in without the usual waste of time in opening the doors. In cold weather this is regarded as a special advantage to the workers.

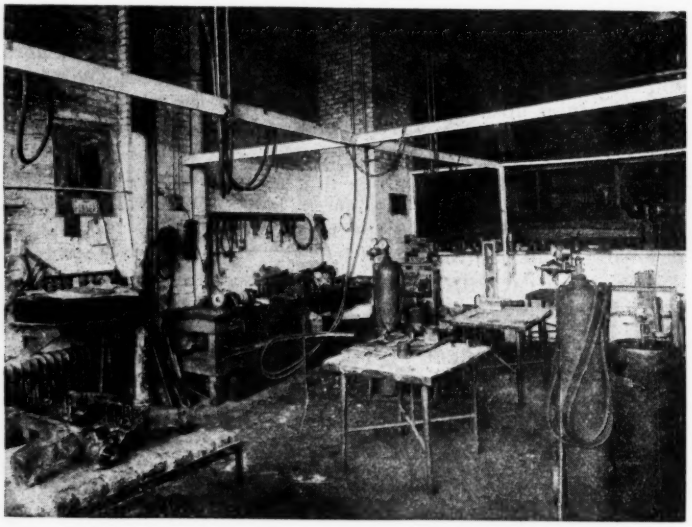


These are the two service cars used by the company and they are fitted out for handling light and heavy jobs without difficulty



One of the features of this service station is its abundance of light in the garage, as the above picture will show

A view in the repair shop, which is rigged out with plenty of machine and tool equipment for the work



Much of the repair work on trucks consists of welding broken parts. Here is the welding department

The stockroom of the plant which is on the first floor at the front end of the building has two distribution windows—one exclusively for the mechanical force of the company and the other for outside trade. By this means confusion is avoided. The stockrooms have a special small tool rack and a show window facing the main room so that the trade while waiting for cars can see the different articles the firm has on sale. This feature has proved a silent but effective salesman—the company officials said.

The welding department of the plant is as fully equipped as its other departments and among the improvements installed there are fire brick topped welding tables. Outside of the plant the company maintains a 1000 gal. gasoline tank and pump.

VERBAL ORDERS DON'T GO

FEDERAL
WELDING DEPT.

DATE _____

Mr. _____

You are authorized to do work Repair Order No. _____

For _____

_____

_____

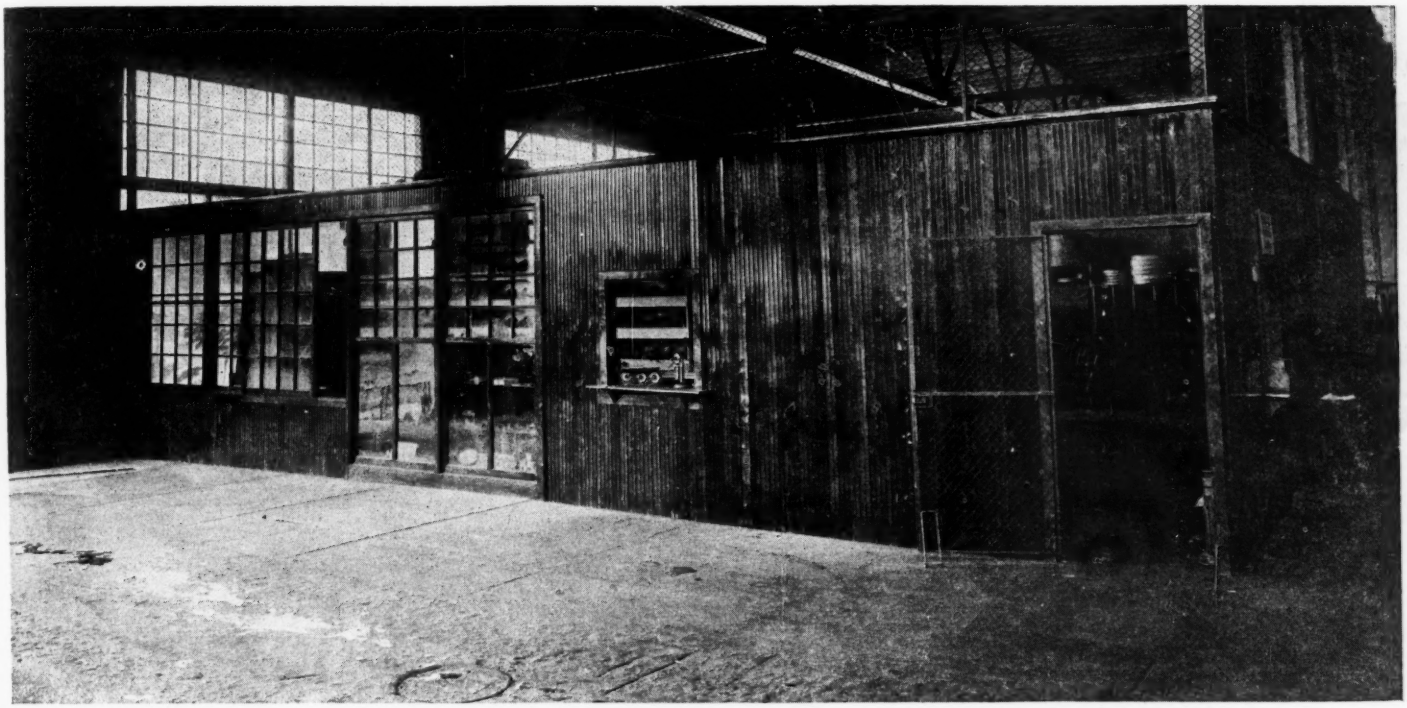
_____

_____

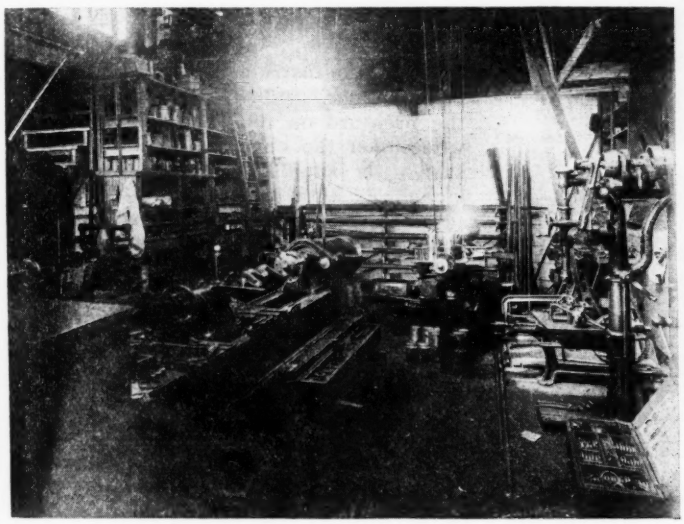
_____

(SIGNED) _____

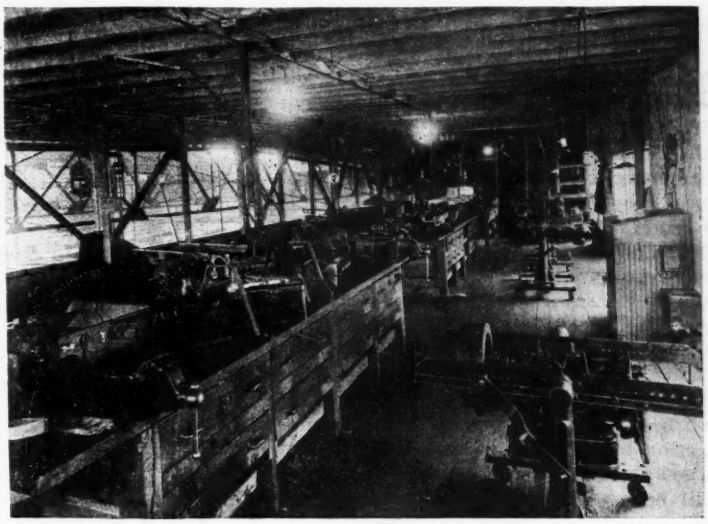
As the above card will show, this concern takes no verbal orders for its welding work. The truck owner gets a duplicate



The stockroom of the concern has been equipped with a show window which acts as a silent salesman



This is a corner of the machine shop and shows the complete layout of machine tool equipment this concern has



The engine repair room of the St. Louis Federal Co. Note the drawers in the benches and the copious use of motor stands

VERBAL ORDERS DON'T GO

FEDERAL
MACHINE DEPT.

DATE _____

Mr. _____

You are authorized to do work Repair Order No. _____

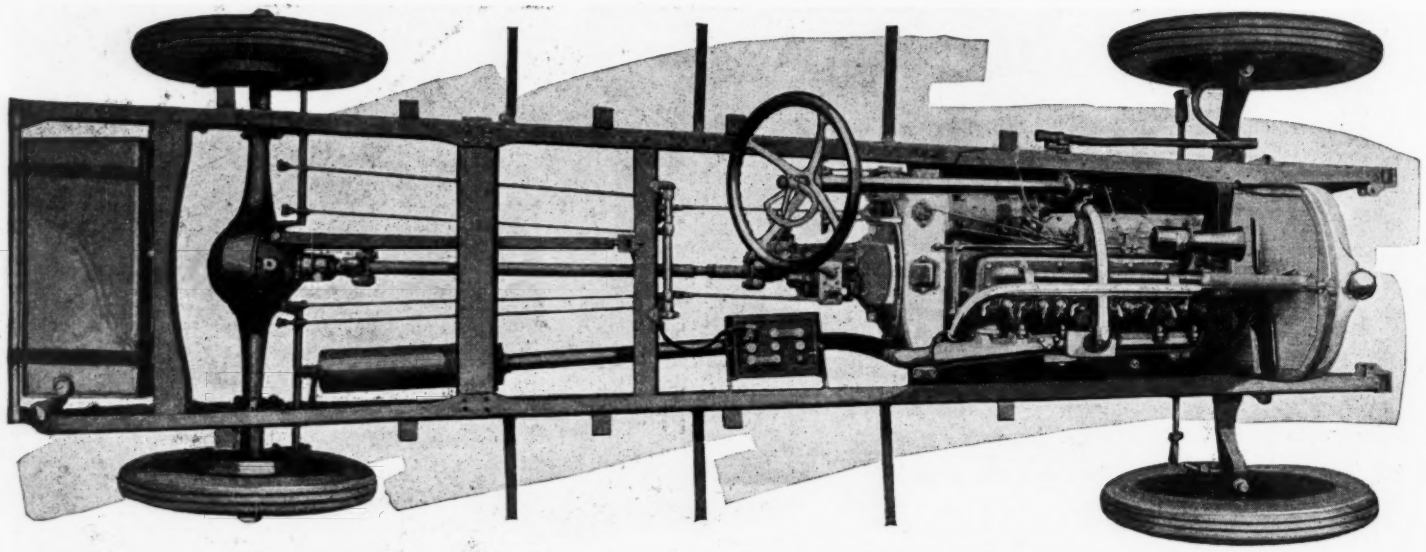
For _____

(SIGNED) _____

This card is essentially the same as the one on the opposite page, excepting that it is used for the machine shop work

The dimensions of the plant are 187 by 152 ft. and it has been constructed so that there are only eight posts supporting the steel girders. Well arranged skylights give the workers all the daylight it is possible to furnish and make the interior look cheerful.

The last statement brings up a point that is well for the automotive dealer generally to pay a great deal of attention to. We have repeatedly pointed out in these columns the necessity for instilling in the minds of customers that feeling which tells him this or that service station is run on a well conducted basis, by which we mean, it is clean, cheerful, there is no lost motion, men are willing, etc. The same applies to the mechanics or workmen in the shops, give them plenty of light and clean overalls often.



Top view of Ferris chassis, showing straight frame channels brake rod layout and disposition of the various units

New Ferris Car Completely Equipped

One Chassis to Be Built Using Standard Units — Body Custom Built — Disteel Wheels Come as Standard Equipment

THE six-cylinder Ferris car which was shown during the National automobile shows at New York and Chicago will be produced in one chassis model, this being a 130-in. wheelbase job carrying 32 by 4½ in. cord tires. The car is made by the Ohio Motor Vehicle Co., Cleveland, Ohio, which concern is most readily remembered by the trade as the manufacturers of Ohio trailers for the past 6 or 7 years. The price of the six-passenger phaeton is $3,390, and the car will be turned out in several color schemes. Prices on other models have not been announced. In the total production of 2000 cars which the company expects to make for 1920, four models will be available, these being the phaeton, roadster, Sedan and coupe.

The engine is a Continental, 3½ in. bore by 5¼ in. stroke, and is too well known to need lengthly discussion here.

Specifications of Ferris

Wheelbase—130 *in.*

Tires—32 *by* 4½ *in., Cords.*

Engine — Continental, six-cylinder, 3½ *by* 5¼ *in.*

Clutch—Borg & Beck.

Starting and Lighting — Leece-Neville.

Battery—Willard.

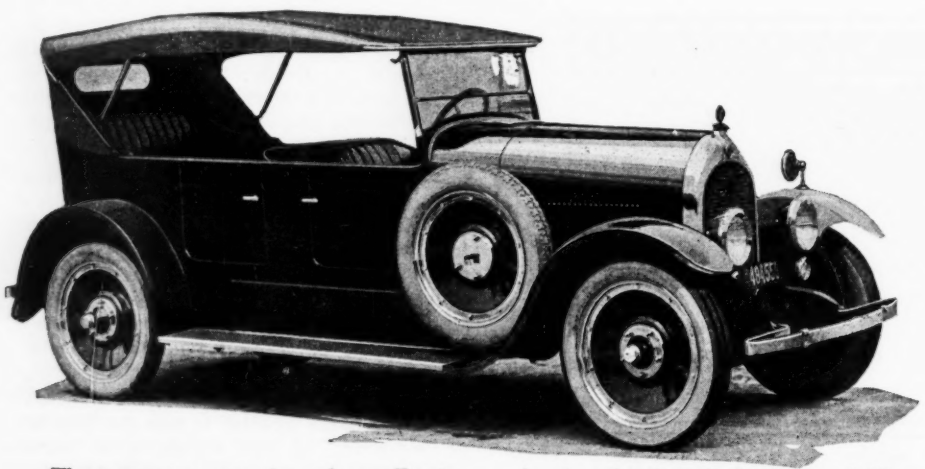
Price—Six passenger phaeton, $3390.

The ignition system uses an aero type magneto. However, in starting the engine the spark furnished by the magneto is supplemented by the entire current from the storage battery, which is sent through the magneto by pressure on the starting switch. This switch is located on the instrument board instead of on the floor. When the engine starts the pressure on the switch is released, whereupon the current for the ignition system is supplied from the magneto alone.

The carbureter is a Zenith and fuel is supplied through a vacuum tank from a 24-gal. tank on the rear, with 3-gal. reserve tank. The clutch is a Borg and Beck and the gearset a conventional three-speed job mounted in unit with the engine. Electrical equipment includes a Leeco-Neville starting and lighting system with a volt and ammeter on instrument board, which not only shows the rate of charge and discharge, but indicates at all times the condition of the battery. The battery is a Willard and is placed on the frame under the front seat. The electrical system, instead of being fused, is connected to a circuit breaker, which does away with burnt-out fuses.

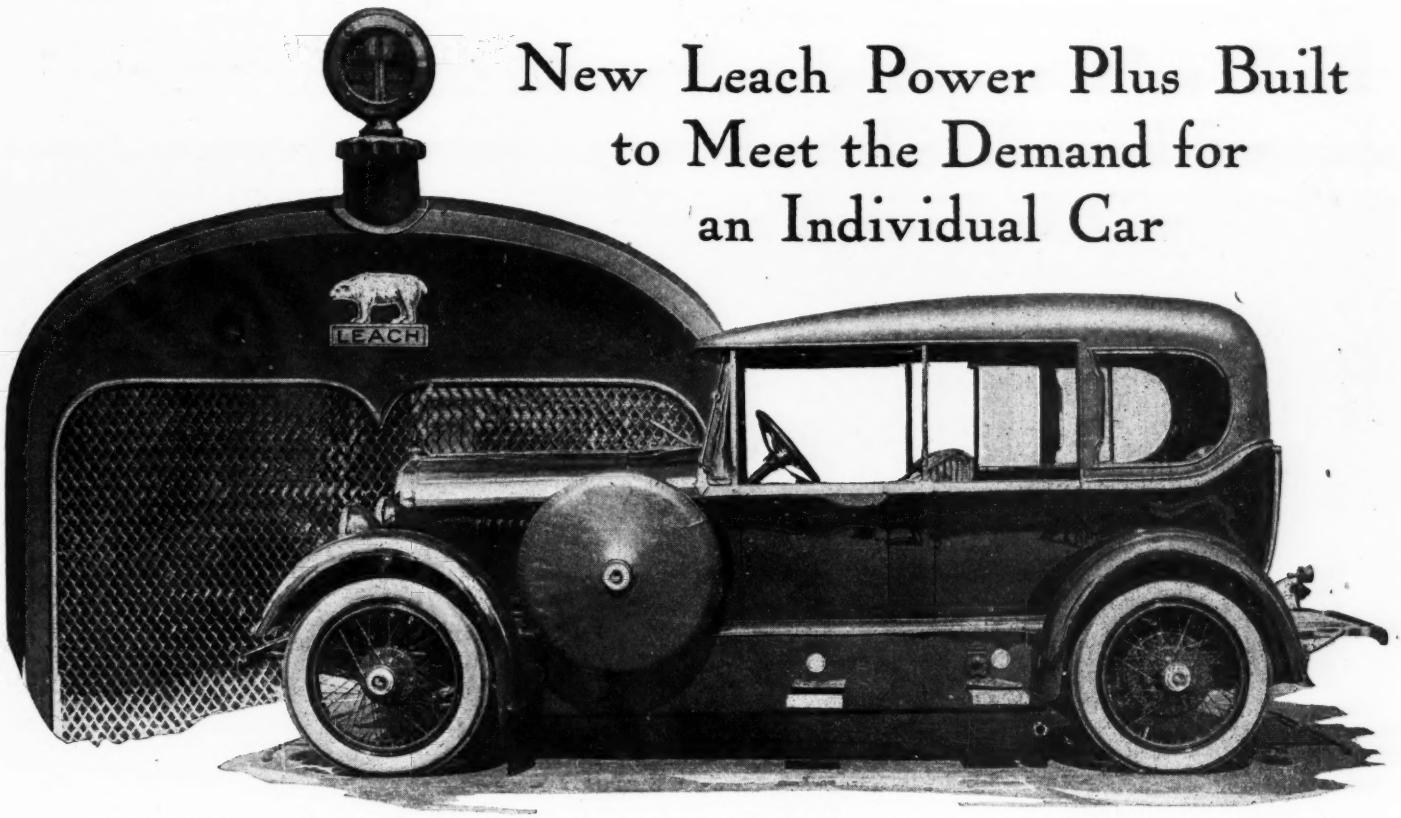
Semi-elliptic springs are used and both front and rear axles are Columbia. As standard equipment five Disteel wheels are furnished, the spare being carried on the left side of the car.

The body is built of aluminum and upholstering of long-grain leather over Marshall springs. The seats are placed quite low and at an angle to insure riding comfort. The equipment included is very complete and consists of an eight-day clock, engine driven tire pump, speedometer, ammeter, volt-meter, gasoline gage, motometer, cigar lighter, windshield cleaner, front and rear bumpers built integral with frame of car, rear vision mirror on front fender and luggage carrier on rear. In addition there are such accessories as foot rail, robe rail, etc.



Three quarter rear view of new Ferris car, showing the deep body design, folding luggage carrier and integral bumper on rear

New Leach Power Plus Built to Meet the Demand for an Individual Car



Front view of the Leach radiator and side view of car, showing the built in top and method of carrying spare wheel. Individual steps take the place of a running board.

THE Leach Power Plus six-cylinder car has been brought out in California to meet the increasing market in that section of the country for the "individual" car. Much is spent in the far West each year by car owners having their cars rebuilt with special sport bodies and in order to take advantage of this condition, the Leach-Biltwell Motor Co., Los Angeles, Cal., has designed a car with comfortable riding qualities and with sufficient power to perform well in mountainous country. The present price of the stock model is $3,750, and finished in velour the car sells for $3,950. The wheelbase is 126 in.

The engine is a Model 9 N Continental, having a 3½ in. bore and 5¼ in. stroke. The company declares that with this powerplant speeds of from 1½ to 60 m.p.h. are possible. Pistons are gray iron and the three main bearings are lined with white metal, bronze backed. The crankshaft is 2⅜ in. in diameter with balance weights forged integral. In other respects, also, the regular Continental construction is used in the engine.

Special Attention to Cooling

To secure utmost radiation in the cooling system, the car has a radiator with a 4 in. core. The cooling system was designed particularly to assure good cooling in desert and mountain use. The core and shell are the product of the Flexo Radiator Co., Los Angeles.

The gearset is a three-speed Brown-Lipe in which is incorporated a disk clutch. The frame is 8 in. deep and both springs are semi-elliptic. Both sets of brakes are on the rear wheels and by a novel system on equalizing, the company claims to have eliminated the necessity of frequent brake adjustment. The foot brake is external and the hand brake internal-expanding. The brake linkage and control mechanism has been so arranged that only a slight pressure on the brake pedal is necessary to slow down or stop the car. This has been done to make the car especially easy to handle for women. Cord tires, 32 by 4½ in. are fitted. Disk wheels can be had, if desired.

Specifications of Leach Power Plus—

PRICE, $3,750.

WHEELBASE, 126 in. Tires, 32 by 4¼ in.

ENGINE, Continental 9N, 3½ by 5¼ in., six-cylinder.

TRANSMISSION and clutch, Brown-Lipe, three-speed, with disk clutch.

AXLES, Timken.

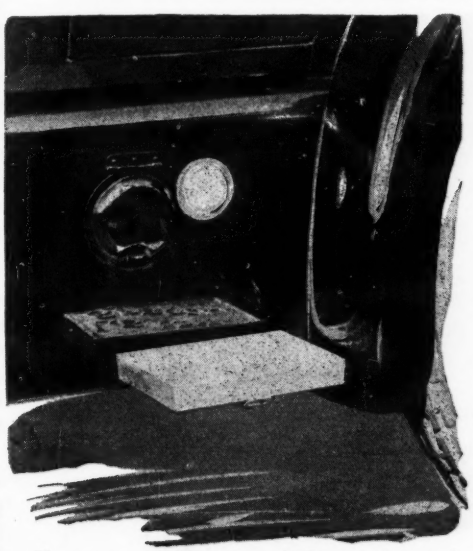
SPRINGS, semi-elliptic, front and rear.

BRAKES, both on rear wheels.

STARTING, lighting and ignition, Delco.

BODY TYPES, seven-passenger, sport and four-passenger speedster.

FINISH, optional.



Close up of the step light used on the Leach Power Plus Six

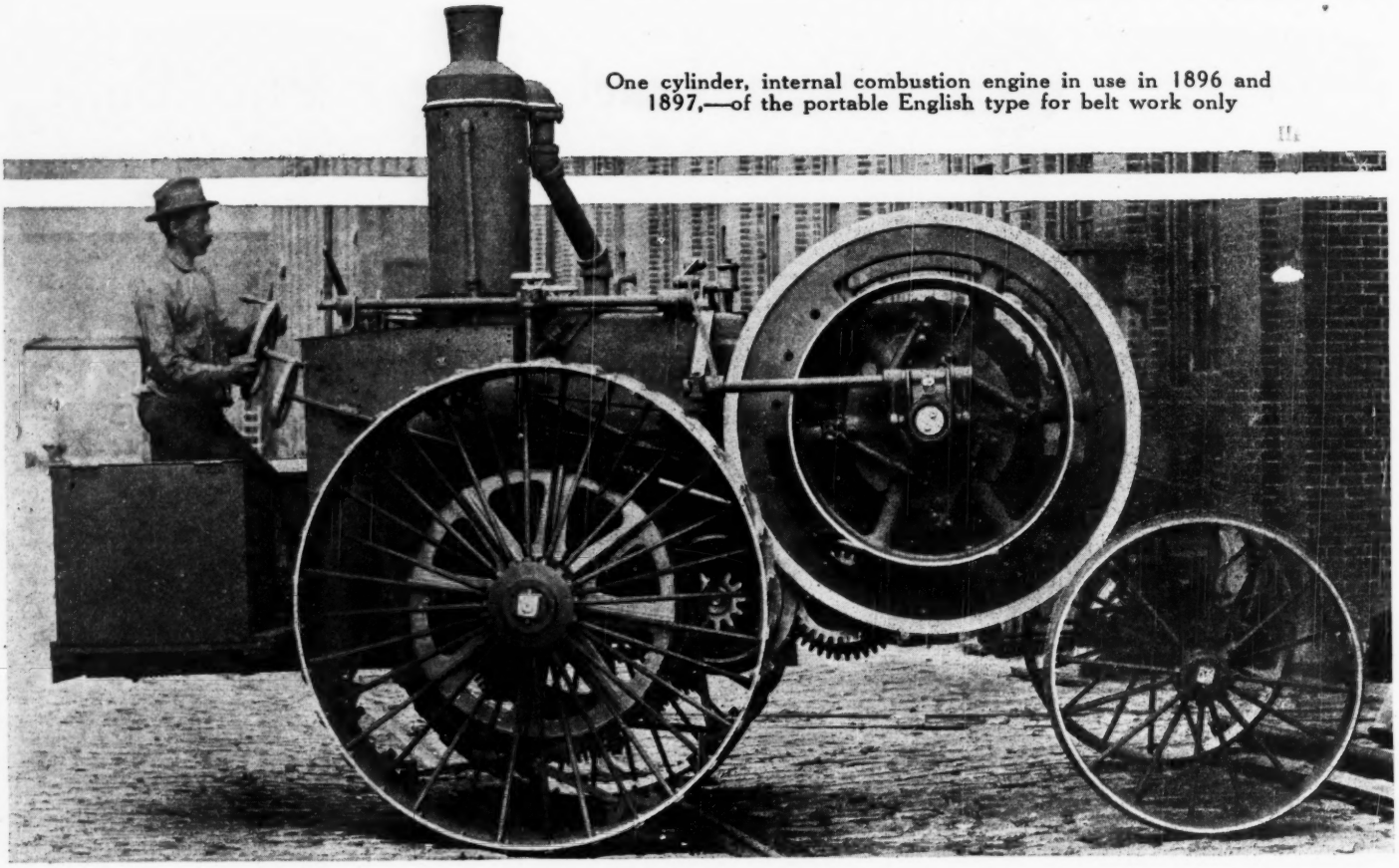
Has Delco Electric System

The electric system is Delco and the battery a Hobbs, a Los Angeles, product. The windshield is built as part of the top and made in sections so if any part breaks, replacement is easy. The top, body and fenders are hand made. At the rear is a combination trunk rack and bumper.

Side curtains which slide up or down feature this car and make it either an open or closed model, doing away with the use of buttons, fasteners or snaps. The curtains when raised lay flat in the top, protecting the composition glass. It requires only a slight pull to operate the curtains and they are ready for instant use. The top itself is of rakish design and is patented.

Two types of bodies are made, a seven-passenger sport and four-passenger speedster. There are many innovations on the car, such as electric lights to illuminate the steps, optional colors, etc. The makers state that twenty-four operations are necessary in applying the finish.

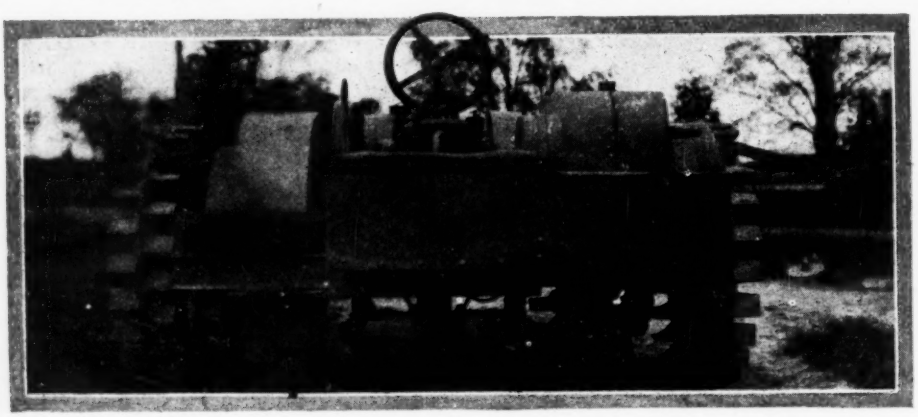
One cylinder, internal combustion engine in use in 1896 and 1897,—of the portable English type for belt work only



The Farm Tractor of Today

Its Beginning and Development

A four cylinder vertical machine. An old-timer with a road grader attached



Three-wheel tractor out in 1911 and 1912 also: width 10 ft.

ONLY those who are familiar with the crude designs of the first internal combustion engines,—which came out in the early 90's—can realize what wonderful developments have been made; not only along lines of mechanical efficiency but in refinement of design as well.

The behavior of those engines of twenty years ago was often exceedingly erratic, their operation and control extremely uncertain. Nevertheless, by a process of sifting out and developing, we have today the highly specialized types designed to meet a particular need in a particular field—the engine for the automobile, the aeroplane, the marine, the stationary, and the tractor engine—each having its individual characteristics and advantages for its special work.

Just about the time the gasoline engine had reached the point where it was a satisfactory power producer mechanically, manufacturers had to face a shortage in gasoline which threatened to become permanent. This meant that an engine had to be designed which would run economically and in a dependable manner using the lower grade fuels such as kerosene and distillate (for these were both abundant and cheap). This necessitated change of fuel and had a very important influence on engine and tractor design.

Because of the great variety in the work of the farmer, much time has been

taken, and expense incurred, in the perfection of an engine suited to his particular needs.

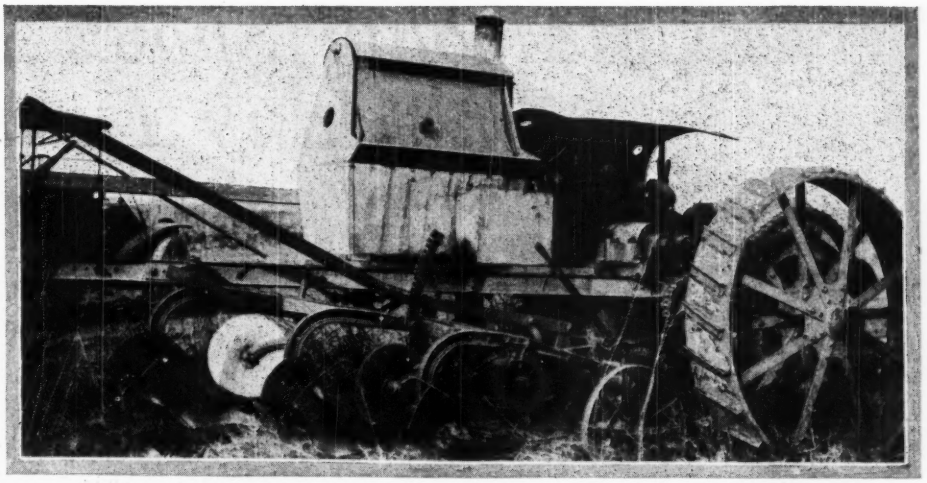
The first engine for use on the farm was a small stationary one which could be used for belt work only: then came the portable type, and last a self-propelling vehicle which could not only move about under its own power, but could haul other loads as well. Tractor power had taken the place of animal power: and the tractor industry was stabilized.

Yet there is no machine manufactured which has to meet such a wide range of requirements and extreme conditions as the tractor. The tractor must be able to operate economically and efficiently under "the heat of the desert, the cold of the arctic, the dry, dusty conditions of summer, the wet and mud of spring, the skilled engine operator in America, or the unmechanical operator from Arabia, good or poor fuel, suitable or unsuitable lubricating oil, soft rain water or dirty hard water, short intermittent operation or long sustained maximum efforts, operating on the level plain without a stone or on the steep hilliside, plowing on firm footing or the floating marsh, soft mellow land or tough sticky clay, shallow scaling the surface or plowing to a depth beyond reason."

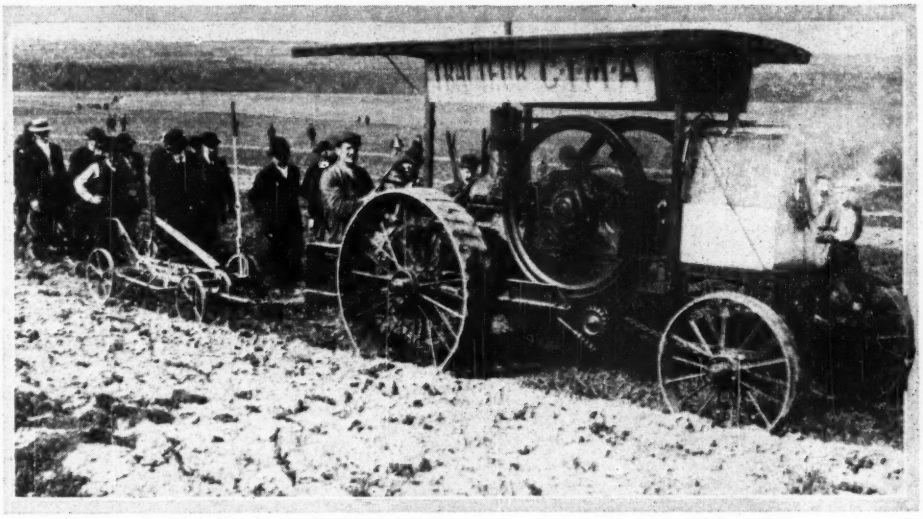
Twenty years ago the materials were not of the quality and variety necessary to safely take the stresses and strains which the tractor must take. Those early engines (and many of the cheap ones today) were made from cast iron and stock steels; and many of them, as the illustrations show, had plenty of cast iron used in their construction.

It's a far cry even from the 1911 and 1912 design shown on the preceding page to the tractor of today.

Still greater efficiency will be attained when the user completely realizes that there are two parts to the farm unit; the farm tractor and the farm machine: the power and the tractor hitch: and that for the best results these must be designed and operated together.



This machine, in use in 1911 and 1912, represents an attempt to attach the plows under the frame. Plows naturally became clogged

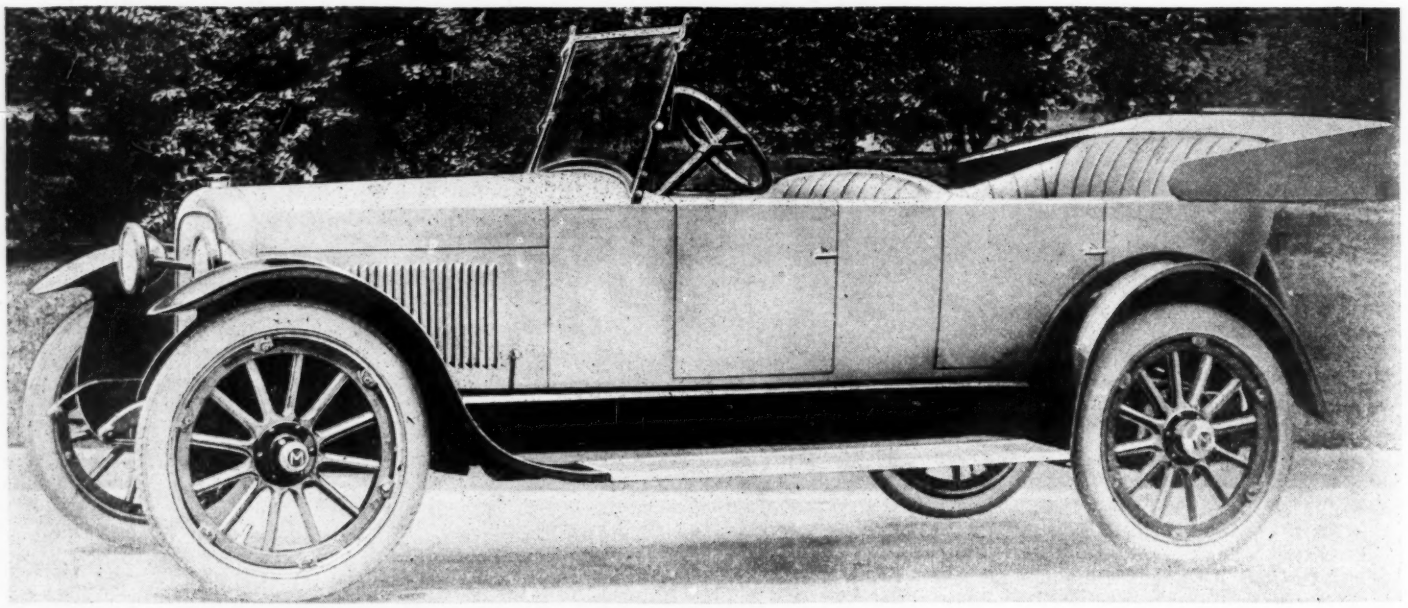


An early model tractor being demonstrated in France. The war has caused France as well as other European nations to develop the tractor as a means of increasing farm production

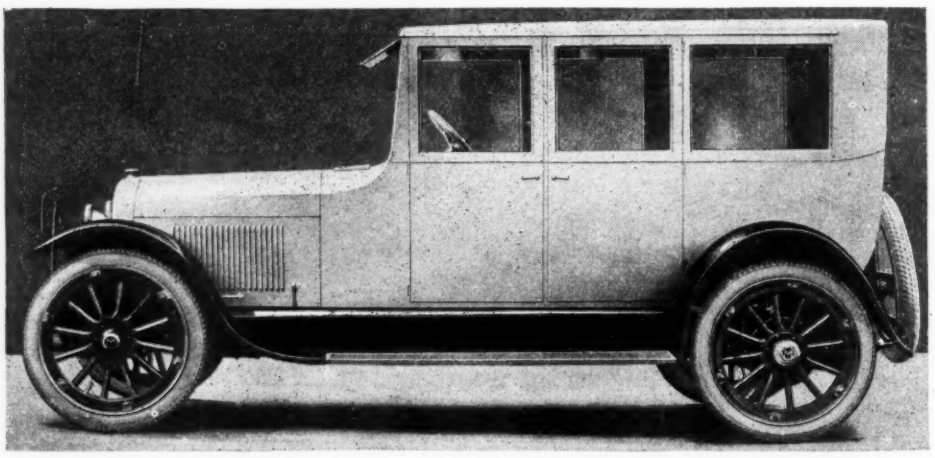
This was a one-cylinder machine which came out in 1912 and 1913; has plenty of cast iron in it: but it has left the farm and is doing the city's work

New Maibohm Shows Refinements in Many Details

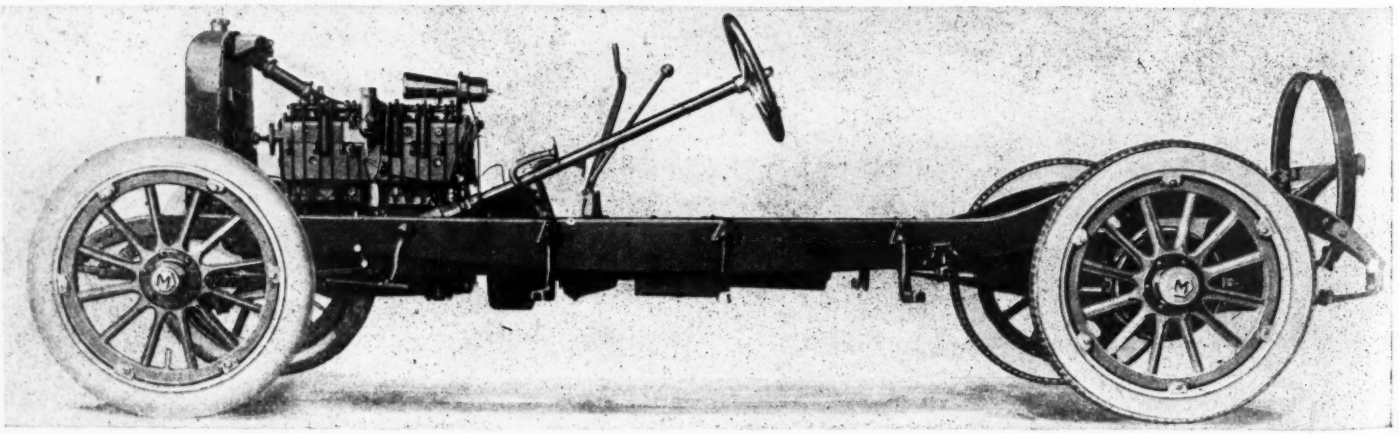
Below Are Shown Their New Models Which Were Described Fully in Last Week's Issue



The 5-passenger Maibohm phaeton. Light weight characterizes this model which is shipped at only 2,350 lbs.. It is finished in dark green with natural wood wheels



The four-door 5-passenger sedan which lists at $2,100. This model is upholstered in French gray fabric. Bodies are Maibohm-built



Chassis of the new Maibohm. The size of the frame section has been increased 100 per cent to 7 in.

Garage Planning
Service Station Arrangements

MOTOR AGE is receiving many inquiries or garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquiries are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 179

REMODELING BUILDING

We enclose a rough pencil sketch showing our lot 100x140 ft. and the present plant built on it. We wish to remove walls "A," "B," and "C," and build west from the north end of present shop to Prairie Street north to the line, east to the alley and then ten ft. south to the end of the present east wall of the present garage.

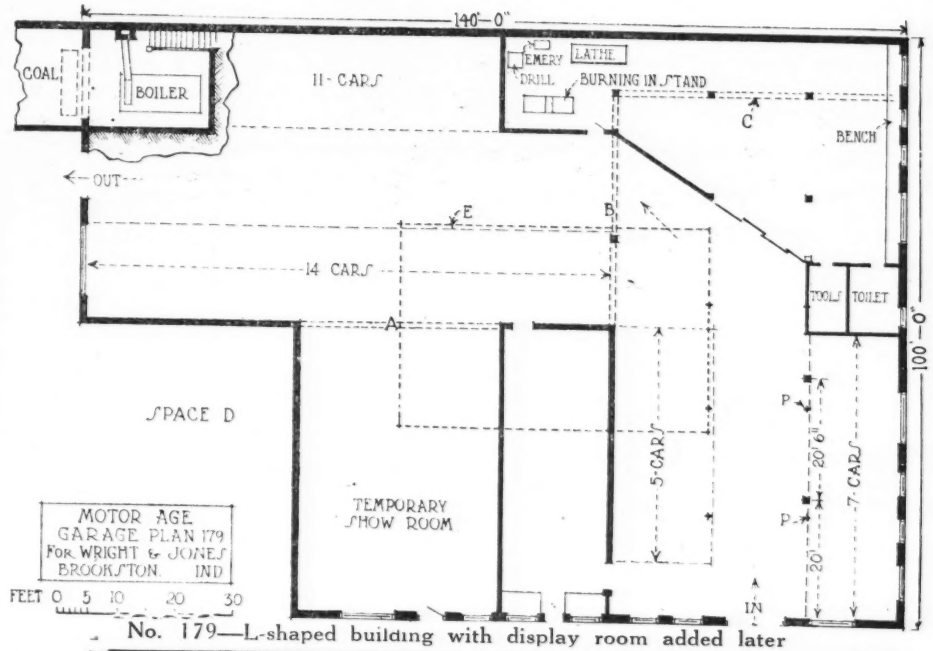
This will give us an L-shaped building 50x140 with an L 50x50, or about 9500 ft. of floor space. No provision is to be made for a display room as space "D" will be used for that purpose when we are able to build it. Neither is there to be any provision for vulcanizing or battery rooms, as they are taken care of in the second story over the front of the present garage.

What we want is your idea as to where the shop should be located, how you think the building should be erected and how the heating plant should be installed. For your further information, will say that the parts room is located in the rear of the office and has a door which will open into the new building. We will be very grateful for any suggestions.—Wright & Jones, Brookston, Ind.

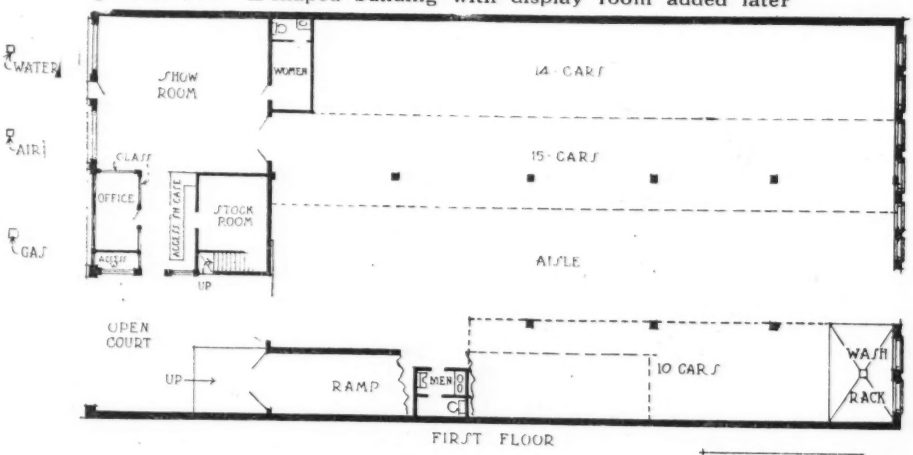
There are only two locations for the shop that we can see, one indicated by the dotted square "E" which would call for a rather extensive and expensive alteration, and one as we have drawn it on the plan. The latter seems more logical because it is farther away from the sales and accessory departments and office.

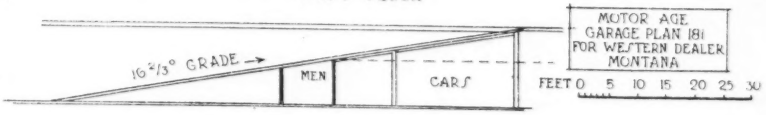
Either of these locations give a clear aisle through the building with entrance on one street and exit on the other—an ideal arrangement. If you want a large storage capacity, it would be better to leave the shop where it is, using all of the 50 ft. wide L shaped space for that purpose.

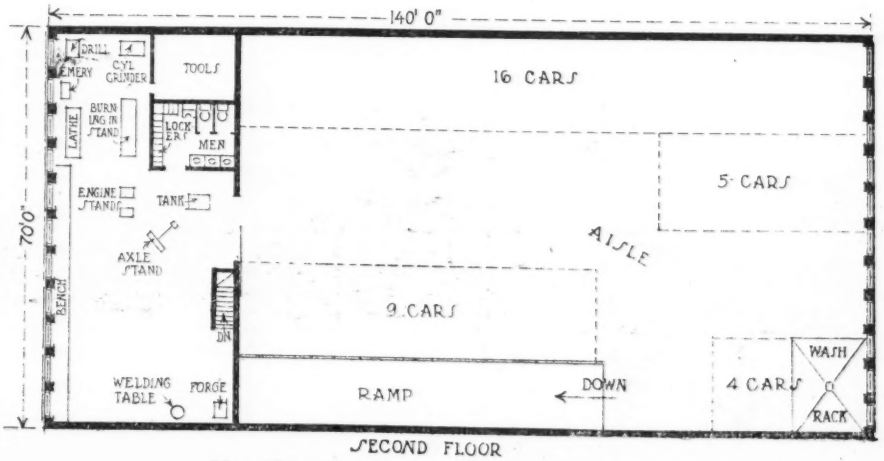
Wouldn't it be possible to use your second floor as a repair shop? It would make an elevator necessary, but most garages find a second floor repair shop more efficient and well worth the extra expenses; there is so much less to distract the men from their work.



No. 179—L-shaped building with display room added later







No. 181—Two-story building with ramp

No. 181

TWO-STORY BUILDING WITH RAMP

Will you kindly have your garage planning department draw us their idea of a two-story general garage and car selling plant 140 by 70 ft. with office, parts room and show room in the front of the building and a 30 by 70 ft. shop upstairs over the office and parts room?

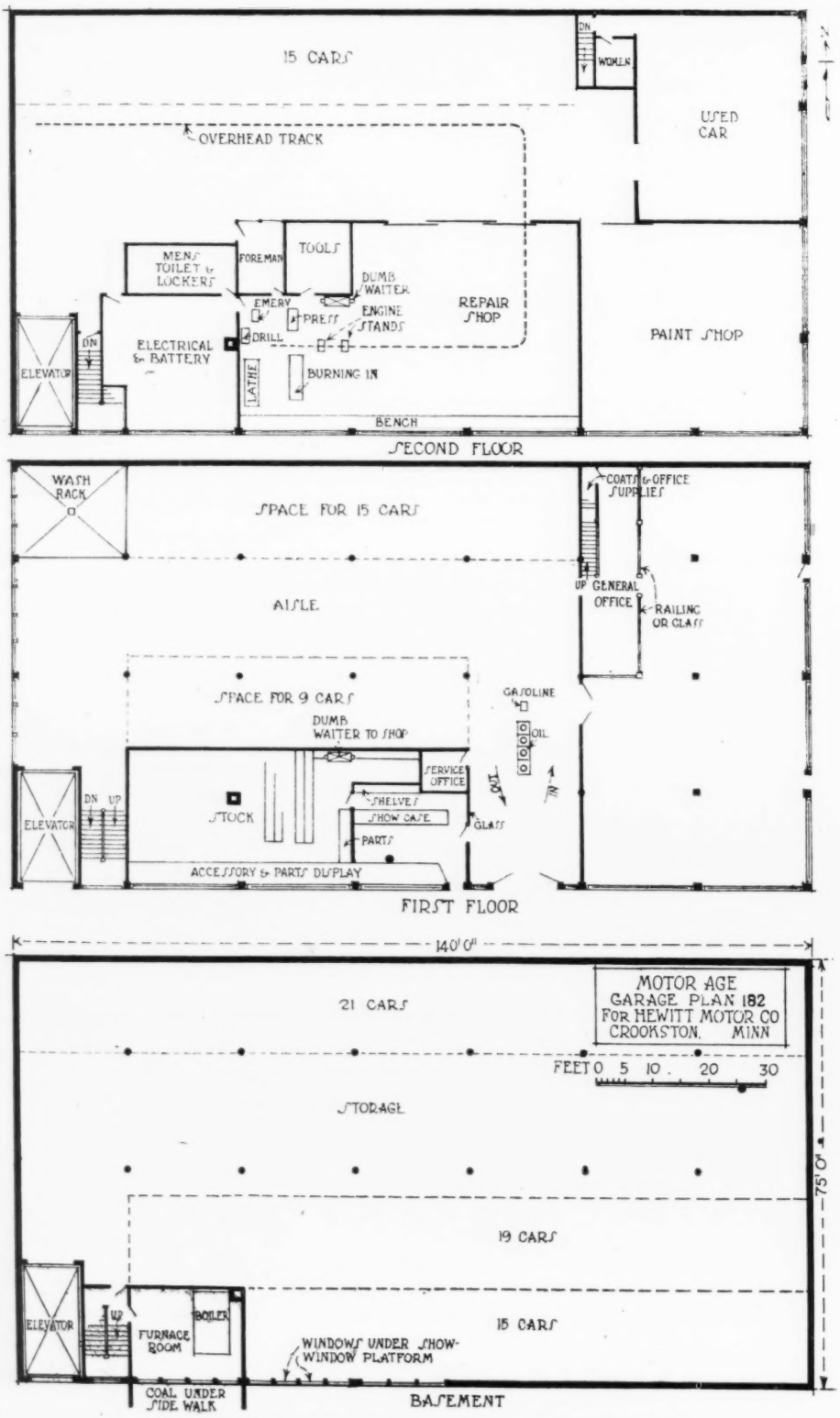
This building is to have a ramp for going up to the second floor; the owner's idea is to have two rows of posts, but the writer believes that if possible the two rows should be boiled down to one. We enclose herewith some rough drawings made by ourselves to give the general idea of the building, etc.—Western Dealer, Montana.

We believe it would not be practical to reduce the posts to one row. It could be done all right but would call for such heavy construction that your building cost would run pretty high.

With one row of posts about 15 ft. from the wall, so that it would not be in the aisle and the other row in the center of the remaining space, they will not interfere materially with car movement. Your new cars may be stored in the row at the back or if you have storage tenants give the back spaces to those whose cars are only out through the middle of the day, leaving the front positions for cars that leave early and come in late, or for transients.

The ramp we show has sixteen and two-thirds per cent grade, which is fairly easy. It could be made longer starting at the front line of the building and extending to within 20 ft. of the rear, reducing the grade to less than twelve per cent.

We rather like the opening space at the entrance, however, it gives protection in bad weather to cars waiting for doors to be opened and to cars going from inside of the first floor to the second floor.



No. 182—Plan for two-story garage and service station

No. 182

GARAGE AND SERVICE STATION

Please furnish plans best suitable for garage on a corner 75x140 ft.; the 75 ft. facing east and the 140 ft. facing south. We shall build a basement and two stories; workshop upstairs in rear of building, which we expect to have modern. Battery service shop, accessory room, office for shop foreman and such other conveniences as you would deem advisable to make our shop, accessories and battery room modern and complete. We want a large shop with overhead track for hoisting machines, lockers, washroom and toilet upstairs. We are handling Scripps-Booth and Oakland cars, of which we expect to have a number of each on hand at all times, and in the winter months will have from fifty to one hundred and twenty-five of these cars on hand, also carry a full and complete line of accessories for both cars. We do not want a driveway in front facing east. We anticipate a space of about 75 ft. on the east or front of the building, by about 40 or 50 ft. deep as show room and offices; and would like to have driveway enter on the south side in rear of office or show room. We will want our gasoline pumps and oils on the inside on first floor; and also wash racks basement to be exclusively for storage with exception for heating and elevator space.

Trusting I have been explicit enough to enable you to make the above requested plans.—R. W. Hewitt, Crookston, Minn.

This arrangement seems to us to be a very good one, there is no crowding anywhere, stairways are well located, aisles are wide and posts are spaced so they interfere very little.

The elevator seems at first thought very far removed, but it is in reality very handy. It can be entered from without and has plenty of approach space inside.

It is not usually the best practice to give good outside window space to a stock room, but here advantage is taken of its position to build in a long accessory and parts display window which in turn makes it possible to install windows to light the boiler room and a section of the basement. It might be well to make use of this light by having auxiliary wash rack beside the boiler room wall.

You probably have the used car problem with you the same as others have and a special display room for these cars where they can be shown to advantage is worth while. A dumb waiter communicates between shop and parts stock room.

The Readers' Clearing House

Questions and Answers

Conducted by Roy E. Berg
(Motor Age Editorial Staff)

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through reserves the right to answer the query by personal letter or through these columns.

DOBLE-DEROIT POWER PLANT

Q—Publish sectional view of some steam car power plant with transmission gears.—Ronald O'Brien, Milwaukee, Wis.

An illustration of a Doble-Detroit, with the whole power plant shown in sectional form is depicted in Fig. 1. The illustration is from the Scientific American.

REDUCING SPEED

Q—Will 34 by 4 in. cord tires in place of the original 37 by 5 in. tires detract materially from the speed of a four-cylinder, right-hand drive Kissel?

2—In replacing the tires what size gears must I have on wheel and elbow? Of speedometer assembly?

3—Did the Kissel factory put a four-cylinder, right-hand drive car, equipped with Master carbureter, Bosch high tension magneto and coil of German make on the market in 1913?

4—What was the selling price of this car?

5—What speed was claimed for this car originally?—C. R. Keller, Pt. Clinton, Ohio.

1—About 9 per cent, unless you put in a new pinion and ring gear to raise the gear ratio.

2—Leave the pinion as it is, and use a 68-tooth sprocket on the wheel. This is all that is necessary.

3—It was a Stromberg carbureter and Esterline magneto that were used on this car.

4—$2,000 to $2,500.

5—Between 50 and 60 m.p.h.

Miscellaneous

REPAIRING BORG & BECK CLUTCH

Q—Publish diagram showing how to repair Borg and Beck dry disk clutch.

2—Give adjustment of cone clutch used on Dort and Overland, model 90, cars.—N. L. Grahaw, Jr., Lumber Bridge, N. C.

1—The question is too indefinite to permit an intelligent answer. In the first place you do not state what is the trouble with the clutch and without this it will be impossible to state how to make a repair. With more information we shall be pleased to help you out.

2—In the Dort you will find under the face of the clutch web several little plungers. The screws should be loosened to permit the plungers to go deeper against the leather face on the clutch. There is a similar adjustment for the Overland, whereby the plungers on the back of the clutch plate can be given more or less tension against the leather.

1919 OVERLAND 90 DISCONTINUED

Q—Have the Overland Co. discontinued the manufacture of the 1919 Overland, model 90?

2—What capacity has the gasoline tank on the above mentioned car in imperial gallons?—G. B. D., Calgary Alberta, Can.

1—Yes.

2—Fourteen and a half gal.

MAKING A NICKEL-PLATING OUTFIT

Q—Show how to rig a nickel-plating outfit for refinishing nickel parts for cars.—H. J. Kuerr, Ft. Barraucas, Pensacola, Fla.

Electroplating machinery is a peculiar sort of apparatus that requires special construction for each individual business. In all the electroplating plants that the writer has had occasion to go through, the electroplating machinery for the most part has been constructed by the plant itself, buying only such parts as are on the market and which could be incorporated into the electroplating system.

No doubt, it is your desire to nickel-plate door handles for motor cars and

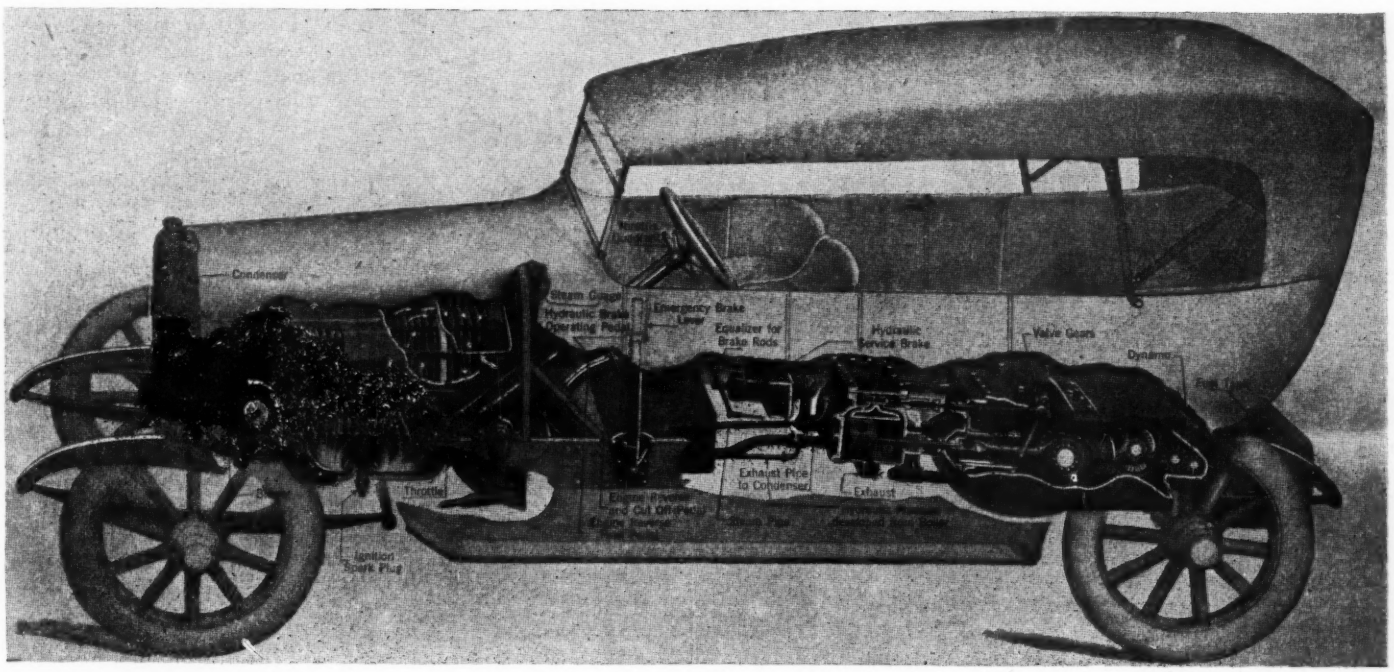


Fig. 1—Doble Detroit steam car. Semi-sectional view showing engine which is of the uniflow type, with a plain slide valve for steam admission made in two parts the action of which are similar to that of a safety valve in allowing excess compression to escape.

The boiler is of the vertical tubular type with the burner and combustion chamber at the bottom, the air for the fuel being fed under pressure by the small electric motor just in back of the radiator. The foot brake is of the hydraulic type operating under a pressure of 500 lbs. per square inch.

other small parts and for this you can make most the appartus yourself. For your current supply you will want a motor-generator set capable of producing direct current at a voltage of approximately 32 and rather a high current rate amounting to perhaps 150 amp., depending, of course, upon the number of plating tanks. The plating tanks you will want to construct yourself and these should be made from a good grade of wood. Mortised construction should be adhered to to assure the tanks being tight. At intervals of eight or nine in., small metal tubes, preferably of copper should be placed and alternating tubes will carry positive and negative electricity. A good way to lead the current into these tubes is to place a copper bus bar along the right hand side of the positive current and on the left hand side for the negative current. The tubes can then be connected in parallel and the articles to be plated hung from hooks on the tubes.

We recommend first that you study thoroughly the process of plating and list the following books on electroplating for your convenience. Standard Handbook for Electrical Engineers, published by McGraw Hill Book Co., and Burggess on Electrochemistry and Metallurgical Industry, Volume 3.

THREAD SIZES

Q—Publish list of different thread sizes to the inch in A. L. A. M. Standard Packard and White.

2—Publish list of different drill sizes say for tapping holes from 3/16 to 1 in. and the threads at a pitch of from ⅛ to 1 in.—James B. Harry, Akron, O.

S. A. E. Threads

Diameter	Threads per in.	Tap drill size
1-4	28	7-32
5-16	24	17-64
3-8	24	21-64
7-16	20	3-8
1-2	20	7-16
9-16	18	1-2
5-8	18	9-16
11-16	16	39-64
3-4	16	43-64
7-8	14	25-32
1	14	29-32
1 1-8	12	1 1-64
1 1-4	12	1 9-64
1 3-8	12	1 17-64
1 1-2	12	1 25-64

Above 1 1-2 in. the S. A. E. threads have two pitches, coarse and fine:

1 5-8	12	16
1 3-4	12	16
1 7-8	12	16
2	12	16
2 1-8	12	16
2 1-4	12	16
2 3-8	12	16
2 1-2	12	16
2 5-8	12	16
2 3-4	12	16
2 7-8	12	16
3	10	16

As far as we know Packard and White now use the recommended S. A. E. standards.

TO assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

MISCELLANEOUS

Ronald O'Brien.....Milwaukee, Wis.
C. R. Keller.....Pt. Clinton, Ohio
N. L. Grahaw, Jr.....Lumber Bridge, N. L. Grahaw, Jr.....Lumber Bridge, N. C.
G. B. D.....Calgary, Alberta, Can.
H. J. Kuerr.....Ft. Barraucas, Pensacola, Fla.
James B. Harry.....Akron, Ohio
A. Layland.....Chicago, Ill.
Fred Harlin.....Itasca, Tex.
Peter Brust.....Milwaukee, Wis.
Henry Bartlow.....Mt. Vernon, Ind.
Quick Tire Service Co.....Monroe, Ga.

THE ELECTRIC SYSTEM

O. W. VanDoren.....Brainard, Minn.
R. J. Simpson.....Litchfield, Mich.
O .W. Amundson.....Morris, Ill
Mark L. Walker.....Mandau, N. D.
Ray H. Meyers.....Newport, Ky.
F. Compton.....Philipp, Miss.
R. W. Pennington.....Grangeville, Idaho
S. A. Elliott.....Hompton, Ga.
C. B. Roy.....Lafayette, La.
Marvin Petersen.....Reliance, S. D.

ENGINES

C. H. Conner.....El Reno, Okla.
Garage & Auto Service Co.....Michigan City, Ind.
G. H. Audubon.....New Jersey
Richard Kemp.....Chicago
Clifford McDowell.....Cozad, Neb.
River Motor Co.....Park River, N. D.
G. M. Greer.....Sikeston, Mo.
John J. McArdle.....Chicago
E. W. Speck.....England, Ark.
S. C. Laverty.....Promise City, Ia.
E. B. Roy.....Lafayette, La.
Chas. Millis, Jr.....Dallas, Tex.
G. B. D.....Calgary, Alberta, Can.
M. H. Page.....Providence, R. I.
S. A. Elliott.....Hompton, Ga.

CARBURETION

Dewey M. Dempsey.....Galena, S. D.
W. Malcolm West.....Cradock, Va.

2—The drill sizes given here are for application to S. A. E. standards. For U. S. S. drill sizes the table immediately following is applicable:

Taps	Drills
1-4 x 28	7-32
5-16 x 24	17-64
3-8 x 24	21-64
7-16 x 20	3-8
1-2 x 20	7-16
9-16 x 18	1-2
5-8 x 18	9-16
11-16 x 16	39-64
3-4 x 16	43-64
7-8 x 14	25-32
1 x 14	29-32
1 1-8 x 12	1 1-64
1 1-4 x 12	1 9-64
1 3-8 x 12	1 17-64
1 1-2 x 12	1 25-64

ADJUSTING TRANSMISSION BEARING

Q—On a 1914 Regal car, model C-524, how is the roller bearing at the back of the pinion in the transmission kept adjusted and where do the fibre washers go?
2—What make of engine has this car?
3—Where can repair parts be obtained for this engine?—A. Layland, Chicago, Ill.

1—The drive pinion can be moved forward or backward by screwing to the right or left the threaded sleeve which contains the roller and thrust bearing in the casting at the rear end of the propeller tube. This threaded sleeve is held from turning by the small plate fastened to the casting directly over the bearing. The plate has a long tongue or projection which extends down and engages with a notch in the end of the threaded sleeve. The latter is notched all the way around thus permitting the proper adjustment to be made. When the locking device is removed the sleeve can be rotated with a punch or screwdriver. Turning it to the right will bring the pinion into closer mesh with the ring gear and vice versa. Either too tight or loose an adjustment will cause them to grind. The ends of the teeth on both pinion and gear should be practically flush when the gears are properly meshed. After adjustment replace the locking mechanism.

If you have to change the position of the ring gear to get proper meshing of the gears, proceed as follows: The cups or sleeves in which the differential bearings are contained are threaded on the outside and rest in corresponding threads in the differential supports and in the bearing caps. By slightly loosening the nuts which hold the caps in place, the threaded bearing sleeves can be turned to the right or left, as may be required. After this replace the caps and tighten the nuts, putting cotterpins in also.

The fibre washers should be placed immediately in back of the splined section of the shaft, between the two large hexagonal nuts at this position.

2—The Regal Motor Car Co. use their own engine.

3—Parts for this car can be secured from the Regal Motor Car Co., Detroit.

FRANKLIN OILING SYSTEM

Q—Give a description of the new Franklin oiling system.—Fred Harlin, Itasca, Texas.

The Franklin uses a pressure recirculating system. The oil supply is carried in the engine base and the amount on hand can be told by the position of a cork float indicator on the oil filler pipe.

No. 5 drill gage. All dimensions in inches.

Size Screw	No. of threads	Size of Drill U.S.S.	"V"	W
¼	24	.201	.196	.202
¼	20	.191	.184	.192
5/16	18	.248	.239	.249
3/8	16	.302	.293	.303
7/16	14	.354	.345	.355
½	13	.409	.399	.410
½	12	.402	.391	.403
9/16	12	.465	.453	.466
5/8	11	.518	.506	.520
11/16	11	.581	.568	.583
¾	10	.632	.618	.634
13/16	10	.695	.680	.697
⅞	9	.745	.728	.747
15/16	9	.808	.790	.810
1	8	.854	.832	.856
1 1/16	8	.917	.894	.919
1⅛	7	.957	.932	.960
1¼	7	1.082	1.057	1.085
1⅜	6	1.179	1.144	1.182
1½	6	1.304	1.269	1.307
1⅝	5½	1.412	1.372	1.416
1⅝	5	1.390	1.347	1.394
1¾	5	1.515	1.472	1.519
1⅞	5	1.640	1.597	1.644
1⅞	4½	1.614	1.566	1.619
2	4½	1.739	1.691	1.744

At the lower left side of the crankcase is a large gear pump, housed within the walls of the oil pan and this draws oil from the reservoir and forces it to each main bearing of the crankshaft through copper tubes, of which there are several. The oil passes from the main bearings through drilled holes in the crankshaft to the disconnecting rod bearings, from which it is thrown off by centrifugal force in a spray against the cylinder walls, camshaft bearings, valve lifters and pump-driving gears. The pistons and wristpins are lubricated by oil picked up from the cylinder walls. The oil after lubricating all these surfaces drains back to the base through a fine mesh strainer and is then pumped over again through the same course. There is a gauge on the dash to tell when oil is being pumped and there are also baffle plates to prevent excess oiling of the cylinders.

IMPERIAL CLUTCH STICKS

Q—On a model 39 Imperial touring car the clutch sticks. How can this be remedied with the least amount of work?—Peter Brust, Milwaukee, Wis.

The clutch is what is known as a multiple disk type and consists of fifty-one plates saw steel, hardened and ground. The plates are beveled to an angle of 20 degrees and fit over steel pins on flywheel. The clutch is self-adjusting and should be cleaned with kerosene at same time oil is renewed in crankcase.

WHAT IS SOFT SOLDER?

Q—What is meant by soft solder, hard solder and paste solder?—Henry Bartlow, Mt. Vernon, Ind.

Soft solder is ordinarily known as tinner's solder, being made from one-half tin and one-half lead. Hard solder has a greater proportion of tin. Paste solder is a prepared solder obtainable at any hardware supply store. It comes in a little tin box and is made up in the form of a paste which is smeared on the surface to be soldered. By running a soldering iron over the paste, the metallic parts held in suspension are melted thus soldering the joint.

OIL GAUGES NOT REGISTERING CORRECT

Q—We clean out a good many crankcases on different makes of cars, and sometimes the oil gages do not register correct. Publish a list of the most popular cars, giving the amount of new lubricating oil required to fill the crankcase.—Quick Tire Service Co., Monroe, Ga.

This is data that is hardly available; at least it is not necessary inasmuch as practically every car made has some form of gauge to show the correct oil level and if the maker's instructions in this regard are followed you cannot go astray. It is found that very often the failure of the oil gage to register is caused by the dilution of the crankcase oil, to the point where the float of the gage does not assume the proper level. New oil of the proper consistency will remedy this.

Electric System

SPARK OCCURRENCE IN SIMMS MAGNETO

Q—When does the spark occur in a Simms high tension magneto?

2—Publish wiring diagram of the Kent system as used on Ford car.

3—Can a low tension Splitdorf magneto, model T, be changed to run left handed so it can be installed on a Buick car, model 16?—O. W. Van Doren, Brainerd, Minn.

1—With the relation to the piston of the engine, the spark occurs when the piston is about 3-16 in. before top dead center. The armature of the magneto travels at the same speed as the engine, and the relation of the armature position to the pole pieces of the magneto is shown in Fig. 2. The angle of variance between the retard and advance positions is 30 deg.

2—The new Atwater-Kent system is shown in Fig. 3. This is for the Ford with the removable plate for application of the starter and generator.

3—Yes.

CHARGING FORD MAGNETO

Q—What is the correct position, etc., of a Ford magneto when charging same with storage batteries?

2—Where can an inexpensive tester be obtained which will determine the condition of the same from outside?—R. J. Simpson, Litchfield, Mich.

1—There are two ways of ascertaining

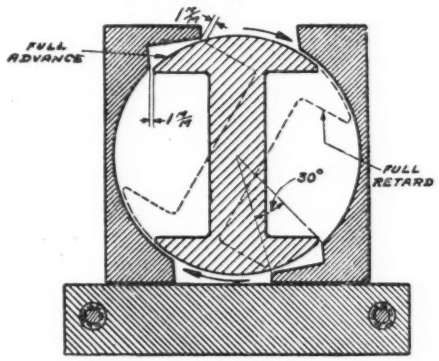


Fig. 2—End view of pole pieces and field frame of Simms magneto showing position of armature at the time of spark.

when the magneto is in the proper position for remagnetizing. Get a small compass and hold it about on a level with the insulated terminal in center of transmission case. Hold the compass about 1 in. to the left of an imaginary line running through the binding post and parallel to the frame of the car, also holding it about 5 or 6 in. back from this binding post. The engine then is turned over very slowly until the compass held in this position registers at a point about 1 in. to the left of this post.

The other way, if one has no compass, is to take the cover of the transmission case off by removing its six machine screws, and after locating the brass studs in the rim of the flywheel turning engine over very slowly until one of them is about in line with a point 1 in. to the left of the binding post. It is then ready to apply current.

Just the minimum current necessary is not known, but very fine results have been obtained with 24 volts from storage batteries. This allows 48 amp. to pass with the old style magneto and 96 amp. with the new one. Dry cells would be too weak for this purpose, although if one had a sufficient number, by connecting twenty-five cells say in series, and connecting two such sets in parallel, requiring forty-eight cells in all, one might expect good results.

But storage batteries are becoming much more common, and only three or four 6-volt batteries are required. All that is necessary is, after connecting the storage cells in series, positive to negative, to connect one end of this battery to the frame of the car and the other to the binding post of the magneto, taking care to break the arc so formed on opening the circuit slowly, and also making sure to disconnect the lights and coil from the magneto as these may be burned out from the high voltage used.

Three to 4 sec. are more than enough

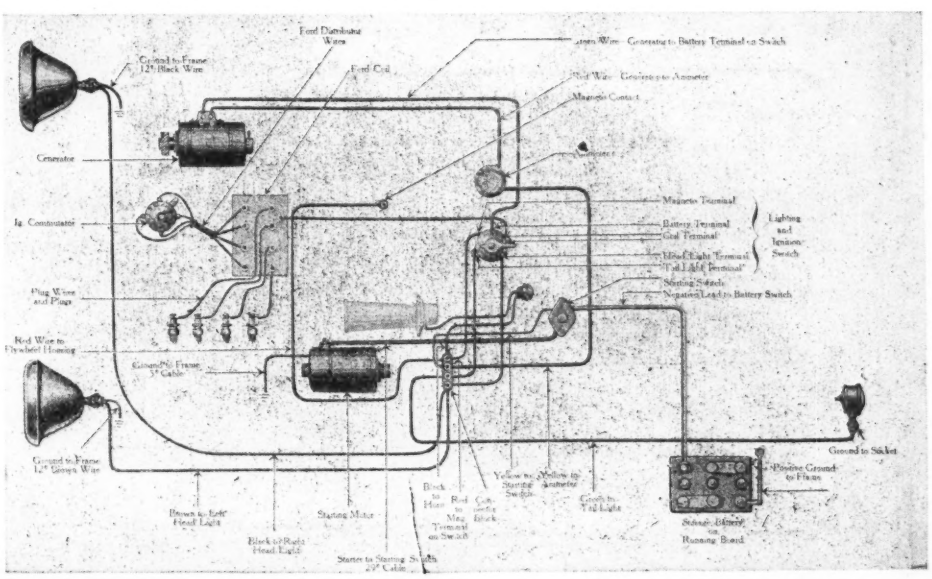


Fig. 3—Wiring diagram of the Atwater Kent system for application to 1919 Fords

to complete the operation, when the normal capacity of the magneto will have returned and the wires may be disconnected.

2—The writer has found that about the most serviceable instrument for this work is the compass, used as described above. It locates the proper position of this flywheel quickly and accurately and that is all that is necessary. A good enough compass can be secured from any hardware store for about fifty cents.

WIRING FOR OAKLAND

Q—Publish wiring diagram of a 1913 Oakland, model 35. The car is equipped with a Briggs generator, a Deaco starter, ammeter, and a Briggs switch, coil and storage battery. A high tension Dixie magneto is now used for strting car. The lights are double contact. O. W. Amundson, Morris, Ill.

We recommend that you use a different type switch, such as we show in the illustration, Fig. 6, for the wiring on this car. Why you should want to use a coil, when your starting is to be done on magneto, we do not see. Certainly it is not necessary to question the reliability of the magneto, by the installation of an auxiliary ignition set.

1914 OVERLAND WIRING DIAGRAM

Q—Publish wiring diagram of a 1914 Overland car, model 81. Car has side lamps and is equipped with an Auto-lite ignition system.—Mark L. Walker, Mandan, N. Dak.

See Fig. 4.

1917 MAXWELL WIRING

Q—Publish wiring diagram for the 1917 Maxwell car.—Ray H. Meyers, Newport, Ky.

The Simms-Huff wiring system as used on a 1917 Maxwell is shown in Fig. 5.

HEADLIGHT CONNECTIONS

Q—Publish diagram and explain how to wire headlights to a Bosch D U-4 magneto.

2—Why does an engine increase speed when the charge is fired before the piston reaches top dead center?—F. Compton, Philipp, Miss.

1—The headlights should not be connected to a Bosch D. U. magneto. There is not sufficient current to light the lamps for one thing, and the machine is not built to light lamps for another.

2—It is true that the breaker points open before the piston reaches top dead center, and that the spark occurs at approximately the same time; but the full effect of the explosion is not felt until the piston starts on its downward trip. There is a physical time element between the time that the fire is started and the time that the limit of temperature is attained. When the spark is retarded, the full effect of the explosion is not felt until the piston has traveled quite a distance on its downward journey.

FREEZING SHOULD NOT RUIN BATTERY

Q—When a battery is frozen but not enough to break the jars, is there any use in trying to recharge it?

2—What effect has a light freeze on the plates?

3—Does it matter much if the jars in a battery touch each other, or should they be separated? Why?

4—I have always been under the impression that the fewer gaps a spark has to jump for ignition the hotter the spark would be at the plugs. Am I right, or will an additional gap or two intensify it?

5—Is the metal on old Ford coil points worth saving? Can it be disposed of?—R. W. Pennington, Grangeville, Idaho.

1—It will depend upon how severe a freezing the battery has been through. Off hand we should say the battery is not beyond use.

2—If the battery has been frozen only to the extent that mush ice were formed, probably no harm has resulted. A hard freeze will be the cause of loosening the material from the grids and once off it will never adhere again.

3—No harm comes from the cells touching, unless they are buckled and possibly have been cracked.

4—There is some merit in a spark gap in that the spark is intensified, particularly where the porcelain of the plug has been cracked. There is, however, no merit in having more than one gap and many authorities say the gap proposition is imagination.

5—It is not worth much considering the work of removing it, coupled with the trouble you will have to go through to market it.

CHARGING RATE OF HAYNES GENERATOR

Q—A Haynes car, model 34, is equipped with a 120 amp. Willard battery. What should be the charging rate of the generator at 35 m. p. h.?—S. A. Elliott, Hompton, Ga.

The charging rate should be 12 amp. Increased engine speed does not increase the charging rate inasmuch as the rate is held by the cut-out.

WIRING FOR MAXWELL

Q—Publish wiring diagram for 1917 Maxwell. Marvin Petersen, Reliance, S. Dak.

See Fig. 5.

Engines

ODD-CYLINDER ENGINES

Q—Are there any seven or nine cylinder aeroplane engines made? If so, explain how they are made and how crankshaft is governed.—C. H. Conner, El Reno, Okla.

All rotary engines have odd number of cylinders and there are five, seven and nine cylindered affairs of this type. Two of the most prominent are the Gnome and Le Rhone, the former being described and illustrated in Motor Age of November 27 issue. This was a seven-cylindered engine. At the recent aviation show in Chicago nine-cylindered Gnome, Le Rhone and Salmson engines were exhibited. In the two former the cylinders revolve around the crankshaft, taking and discharging the gases through ports which are passed, while the ignition is also picked up en route. In the case of the Salmson, which is water-cooled, whereas the others are air-cooled, the cylinders are stationary and the shaft and hubs revolve. The cylinders are held in a circular frame made of tubing and this forms the manifolds at the same time.

INCREASING INTAKE MANIFOLD

Q—On an Overland car, model 83, would a larger intake manifold increase the speed and power, leaving the valves as they are?

2—Would it be necessary to use a larger gasoline feed pipe on above mentioned car?—Garage & Auto Service Co., Michigan City, Ind.

1—You probably will obtain a little more speed and power, but the engine will be harder to start and will not idle and throttle down as well. Naturally we presume you intend using a somewhat larger carbureter. Let us suggest that you increase the valve diameter about $\frac{1}{16}$ in. by taking off a $\frac{1}{32}$ in. cut and using larger valves and a little heavier valve springs. So long as you are going into it, why not do the job right?

2—Probably not, but you can easily try the old line and if it does not feed the carbureter it can easily be replaced with

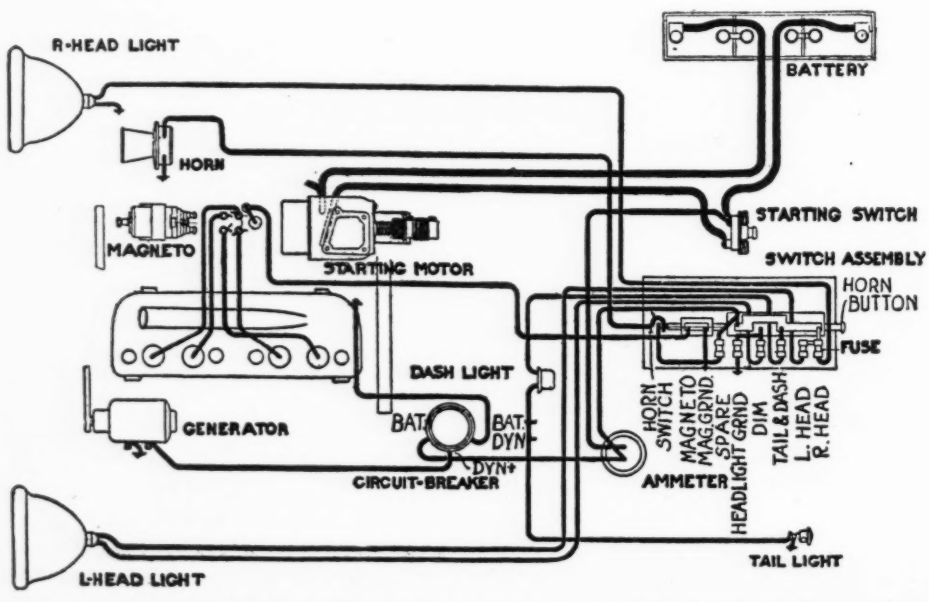


Fig. 4—Autolite electric system as user on a 1914 Overland 81

a larger pipe. Use valve reamer and ream the port all the way through, thus increasing the valve port diameter about $\frac{5}{16}$ in. Then use an oversized valve reamer and ream the new port producing the seat for the valve. Then grind in the valves. The benefit obtained by merely increasing the manifold size will not be very material. A cooling action and wire drawing effect will be produced by the comparatively smaller valve passage that will not be very good for the best operation.

NOISE IN TIMING GEARS

Q—Last July I installed a set of timing gears on a Chalmers car, model 26. Whenever the car is running they have made a noisy humming sound. How can I remedy this trouble?—G. H., Audubon, New Jersey.

New timing gears are most apt to be somewhat noisy, due chiefly to the fact that they are installed without the further necessary act of lining up both the crankshaft and camshaft through refitting of the bearings all through. The old gears were, undoubtedly, worn through long use and it necessarily follows that the bearings carrying the crankshaft and camshaft also had worn, permitting a separation at the correct point of contact on the gears; that is, as originally laid out and intended. This is a point too often overlooked even by good mechanics. Even if you now line up the bearings of the shafts you cannot expect a set of quiet running gears inasmuch as those now in use have worn where they should not wear and they can never be run in perfectly. If the shafts are lined up so the gears come into proper mesh, however, they will be greatly improved and will in time improve.

CUTTING CYLINDER STROKE

Q—Is it possible to take a car with a 6-in. stroke crankshaft and build up cylinder block or drop crankshaft to cut stroke to 5-in.? Can this be done without making new crankshaft and will it reduce piston displacement?

2—Would a car with a bore of 3¼ in. by 5½ in. stroke develop as much power and speed as a car with a bore 3¾ in. by 4 in. of the same weight or would a six-cylinder car of same piston displacement be faster and more powerful than either?

3—Give bore and stroke of a 1912 and 1913 Cadillac car.

4—Can a powerful engine be geared up for speed through transmission and rear axle and what gear would have to be changed in transmission? Richard Kemp, Chicago.

1—The idea is not feasible, for it would reduce the displacement and lower the compression so much the engine would have no power. Even though you did this, the stroke would still be 6 in., for the crankthrow remains the same, and this determines the stroke.

2—All things being equal otherwise, the car with the engine of larger bore would probably be faster, but this means equal weight and many other things. The new size racing engines of 183 cu. in. will be just about 3¼ bore and 5½ stroke and they will show some speed that will be remarkable.

3—The 1913 Cadillac engine had a bore of 4½ and a stroke of 5¾ in.; the 1912 bore and stroke was 4½ in.

4—Yes. Ordinarily it would be necessary to change the driving pinion and the ring gear in the rear axle. Not knowing the car and engine you have in mind we cannot be sure that you can get gears that will fit. You probably could not make a change in the transmission, for this would be direct on the high gear anyway.

REMOVING PISTON RINGS

Q—What causes plugs to foul in summer and not in winter?

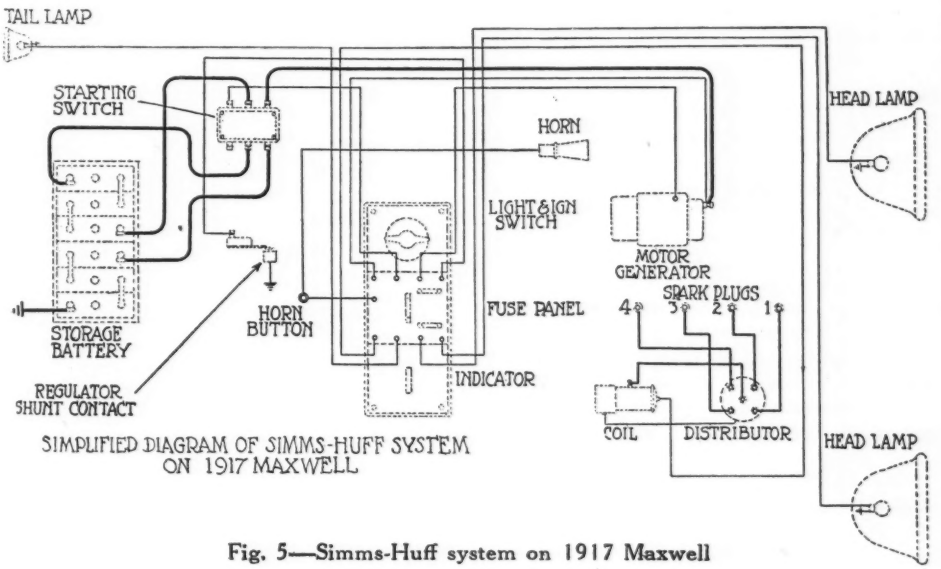
2—How can old rings be removed from pistons without breaking?

3—How often should the carbon be removed?—Clifford McDowell, Cozad, Neb.

1—Inasmuch as you do not state the make of engine it is not easy to diagnose a case of this nature. Off hand we imagine you are using too much oil in the summer. In the winter the oil becomes stiffer and consequently not so much will find its way into the combustion chamber. However, it might also be a case of poor carbureter adjustment and possibly a little of both troubles.

2—Begin by taking the bottom ring off first. By using pieces of hack saw blades—four of them—you can remove the ring without difficulty. The pieces of blades should be slipped under the ring and then be equally spaced around the cylinder. This will spread the ring all the way around and it will be no trouble to slide it up and clear of the piston. Rings should be replaced in the reverse way. If you cannot get pieces of hack saw blades you can use strips of tin, but these will tend to bend. Strips of thin brass or any other metal can be used. The strips should be not more than ⅜ in. wide.

3—There is no set rule for this; some cars in the hands of good drivers will go six months, or even a year, without carbon trouble; others perhaps a month. A good deal depends upon the driver, the nature of the driving, etc. If the car is driven at very slow speeds on high gear, as for instance in traffic, carbon will accumulate; whereas if it is out in the country where the surplus oil can be



SIMPLIFIED DIAGRAM OF SIMMS-HUFF SYSTEM ON 1917 MAXWELL

Fig. 5—Simms-Huff system on 1917 Maxwell

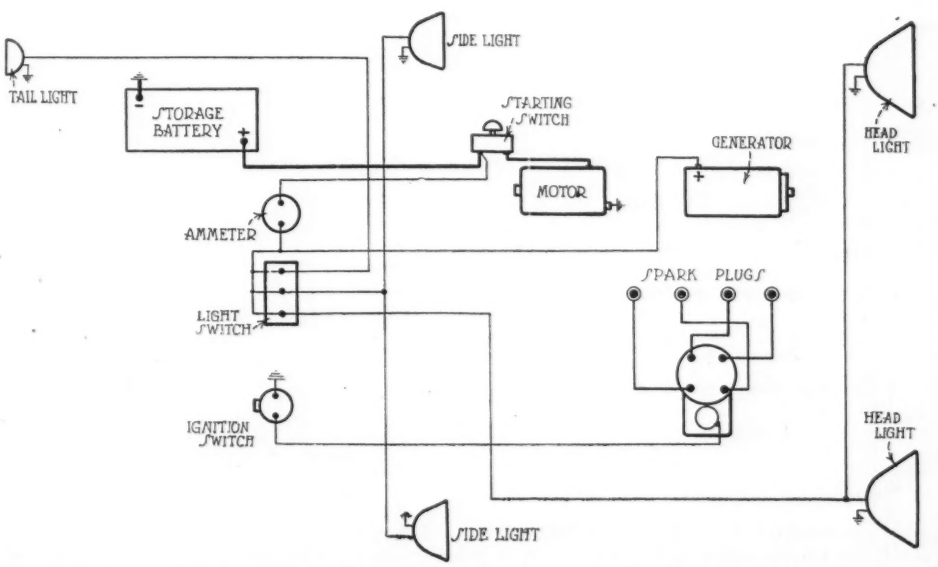


Fig. 6—Special diagram for Oakland car with non stock electric equipment. A Briggs generator with a Deaco starter together with a high tension Dixie magneto is used

burned through fast driving, carbon will not accumulate so rapidly. You can tell when carbon has accumulated by the fact that a pre-ignition knock will develop when the engine is hot and the throttle is opened rather suddenly. Sometimes a rather heavy accumulation of carbon on the spark plug barrel will indicate that the top of the piston and inside of the combustion chamber have excess carbon deposits. Perhaps you do not change the oil frequently enough. About 500 miles of running is all that oil will stand.

BUILDING POWER SLEIGH

Q—Give suggestion to construct a power sleigh using a Ford engine.—Park River Motor Co., Park River, N. D.

An idea of what you desire is shown in Fig. 7. The narrower the bob the faster it will be, but it will require more efficient handling, particularly in making turns, where it will be necessary to slow down materially. The length will have to be worked out to suit the fittings. Because of the great length required you should have a truss under each side member, which can be made of 3/16 in. rod, with about 3 in. studs and a turnbuckle to take up slack. Besides having the front bob made to swivel to enable steering, there should be a step on each side upon which to brace the feet. The engine will set a little back of the middle and this will about balance the weight of two passengers, sitting ahead. To use a Ford engine it will be necessary to fit a bevel gear to the end of the shaft, and a bevel gear on a cross shaft, upon which is to be a driving sprocket, which can be the same as those used on motorcycles. Provide a thrust bearing on the back of each bevel gear and of course the necessary oil holes in the bearing carrying the countershaft. The side of the shaft upon which the bevel gear should be will depend upon the location of the drive wheel. It should be on the right side—looking forward—as the flywheel of the engine should be set to the front, which will make the engine turn to the left when looking backward. You can easily connect up throttle, spark and transmission levers to suit your needs and in accordance with the position of the operator, who will sit in front. It can be arranged so one can steer and the one in the second seat operate the levers, but this will be bad in that one could not manage the bob alone. The second seat person can operate the bob alone if an auxiliary steering arm is placed back and connected with the front by means of cables or rolls, one on either side. It will be necessary to have distance rods between the axles of the rear wheel and the countershaft in order to hold the wheel in place when the engine is pulling. Also a frame like a triangle should be rigged above which, with the aid of a strong spring around a vertical shaft, will tend to hold the drive wheel down. This rigging can be made up to use with a pneumatic tire and anti-skid chains for either road or ice, or with a steel rim and small spikes set therein so the bob will be available for use on ice alone.

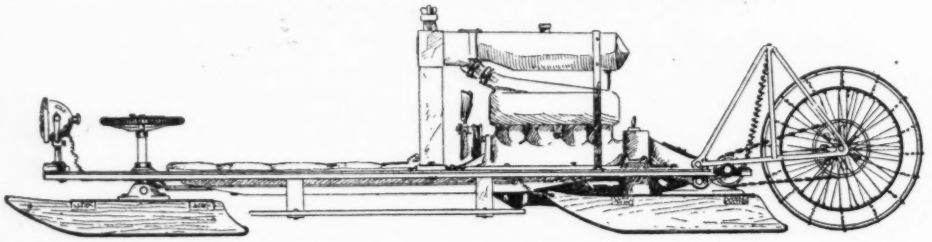


Fig. 7—Suggested scheme for applying a Ford engine to a power sleigh. The drive from the transmission is taken by a bevel gear to a chain. A pneumatic chain equipped tire is shown here but this might perhaps better be a steel wheel with sharp lugs for better traction.

Carbureter

CARBURETER SETTING

Q—Give correct position of the spray nozzel of different makes of carbureters.—Dewey M. Dempsey, Galena, So. Dak.

Carbureter setting is an art. Any "carbureter expert" will tell you that a correct setting can be had by turning a certain screw so many notches to the right, and some other screw a few notches to the left and this or that turned to some other position. Rules of thumb cannot be relied upon to set a carbureter. The only correct way to set a carbureter is to observe the condition of the engine while the adjustment is being made. One good way is to turn the adjustment needle a few notches and then go to the rear of the car and examine the exhaust. If there is a strong fuel odor it is a good indication that the mixture is too rich. A black smoke generally accompanies a rich mixture.

The writer recently met a "carburreter expert" in a motor car factory whose scheme for setting the carbureter on the engine was to turn the low speed screw eleven notches to the right from the closed position and a turn and one-half from the closed position on the high speed screw. There is one good thing to say about an adjustment of this kind. The engine will run after a fashion and is a great time saver.

Where economy is a consideration, though, we do not advise the setting given in the above paragraph. A good method which can be followed generally for any carbureter is to retard the spark lever with the engine running idle. Then turn the low speed screw in the direction that thins the mixture until a perceptible slowing down in the speed is noticed. By reversing the direction of movement on the screw a notch or two the correct low speed setting will be had. Sometimes it is found that an engine does not idle as slowly as it ought to. Correction for this can be made by turning the stop screw which controls the extent of opening of the butterfly valve.

The next step is to adjust the high speed nozzle. To do this advance the spark lever to its one-half way position and then grasp the bell crank that controls the butterfly valve, press down on it moderately fast and if the engine speeds up without coughing or backfiring the high speed adjustment should be turned so that the mixture is thinned down. This movement should be a notch or two. Then speed the engine up again and repeat the operation, if the coughing point has not been reached. As soon as the position has been reached where the engine coughs on acceleration the direction of rotation of the screw should be reversed a notch or two in which the coughing just disappears. This is the most economical mixture that will give a reasonably fast pick up.

ZENITH CARBURETER FOR FORD

Q— Would a Zenith No. 0-5 carbureter be too large for a Ford engine?—W. Malcolm West, Cradock, Va.

Not unless you use a special manifold of larger dimensions, and then the valves should be larger and the valve seats reamed out somewhat. If you simply want to use a Zenith carbureter to replace the one you have you can obtain from the Zenith people a special Ford carbureter and manifold that can be installed by anyone in a few moments. This was recently described in MOTOR AGE.

LOOSE PISTONS OR RINGS CAUSE OIL PUMPING

Q—How can oil pumping be remedied in an Oldsmobile 45, eight cylinder? This car is equipped with aluminum pistons.

2—Where can cast iron pistons for this car be secured?

3—Will the connecting rods that are now in the engine be strong enough for cast iron pistons?—G. M. Greer, Sikeston, Mo.

1—It may be stated as a general rule that loose fitting pistons or rings, or the cylinders out of round, will account for so-called oil pumping. This theory is borne out in particular if all the cylinders have the trouble; it would not seem reasonable to think it an inherent trouble. We suggest that the cylinders be carefully measured to see if they are out of true and if there is a difference in the sizes of them. Probably you will have to have them reground and oversize pistons fitted. These can be procured from the Oldsmobile people or from the dealer from whom you bought the car. The pistons can be fitted reasonably close; in fact, this kind of piston is now fitted closer than heretofore. The proper fit would be to give a clearance of about .003 in. at the skirt, .055 in. at the

lower and, .007 in. at the middle and .009 at the top. This will also call for new rings and if all these parts are carefully fitted you should not have trouble in the future.

2—You might try the Green Engineering Co., Dayton, O., which makes what is termed a semi-steel piston that is considerably lighter than the ordinary gray iron piston.

3—This is doubtful, for they are made very light and even steel pistons or semi-steel pistons must naturally weigh more than the aluminum-alloy pistons now used. For this reason we have suggested over-sized pistons of the same kind now employed.

REPLACING CHEVROLET 490 FLYWHEEL.

Q—Instruct and illustrate how to replace a flywheel on a Chevrolet 490, 1919 model, with starter.

2—Can the pulley on crankshaft be replaced which hand crank fits into?—John J. McArdle, Chicago.

1—It will only be necessary to remove the clutch and clutch parts, including the throw-out collar and yoke and then unbolt the flywheel from the flange on the crankshaft. You will find six ⅜-in. bolts that will have to be removed. Then by gently tapping the flywheel it will come off without difficulty.

2—Yes. Drive out the pin that holds it in place on the crankshaft end and use a wheel puller, if necessary, to draw off. Possible tapping will remove it. This pulley is also held by a Woodruff key, to prevent turning on the shaft. This, however, will not prevent the pulley being removed when the pin is taken out.

R.P.M. OF CHEVROLET ENGINE

Q—How many R. P. M. can a Chevrolet engine, 1918 model 490, make?

2—What is the speed of a 1918 Chevrolet model 490 on good roads?

3—What is the speed of a Maxwell 25?

4—What is the speed of an Oakland 6?—E. W. Speck, England, Ark.

1—About 1,800 r.p.m.

2—Anywhere from 45 to 53 m.p.h., depending upon condition of engine, state of roads and ability of driver. A well tuned-up model should be able to do about 55 m.p.h.

3—About the same as the Chevrolet.

4—Upward of 60 m.p.h.

TAKING UP MAIN BEARINGS

Q—Instruct how to take up the main bearing in an old Paige 4-36 engine. S. C. Laverty, Promise City, Iowa.

Main bearings can be taken up by removing the shims between the bearing cap and its upper half. Take out just enough shims so that the tightness between these bearings and the shaft will be noticeable when the flywheel is turned by hand, with the spark plugs out and the priming cocks open.

LIGHT STEEL PISTONS

Q—Publish address of company who manufactures pistons as light or nearly as light as Lynite pistons.—E. B. Roy, Lafayette, Louisiana.

Try the Green Engineering Co., Dayton, O., which makes a light steel piston.

DESIGNING OAKLAND SPEEDSTER

Q—Publish design of a racing body for an Oakland car, 6 cylinder, model 34-B.

2—Could any part of a five passenger body be used in building racing body for Oakland car?

3—What is the speed of an Oakland "6," model 34-B?—Chas. Millis, Jr., Dallas, Tex.

1—Rather than use the space for a speedster design, we are suggesting that you look up several back number of MOTOR AGE and from these you can undoubtedly find a speedster design that will meet with your approval. The Clearing House department at this time is so overwhelmed with inquiries, that we are a little late in getting answers through.

2—You might be able to use the cowl, but you would hardly desire to retain the windshield features. As a matter of fact little will be saved in the way of material and work and so, we believe, it will be better to build up an out-and-out racing body and forget any portion of the body now on the car.

3—This car has a 4.5 to 1 gear ratio, the engine will turn up 2600 r.p.m., and as 32 by 4 in. wheels are used the speed would figure out about 63 m.p.h. Built into a racing car, stripped down to save weight and with a higher ratio additional speed could be obtained.

QUESTIONS ON THE OVERLAND 90

Q—State the highest speed obtainable with the 1919 Overland, model 90, and the number of revolutions per minute at such speed.

2—Could the priming cock holes on a 1919 Overland, model 90, be bored out large enough to receive spark plugs?

3—Where could light-weight pistons of cast iron or semi-steel be obtained for the above mentioned car?—G. B. D. Calgary, Alberta, Can.

1—With a 4 to 1 gear ratio a trifle better than 45 m.p.h., and with a 3 to 1 ratio about 60 m.p.h., as the engine turns up 1,800 r.p.m.

2—Yes; or you can get mates to the spark plug caps which carry the spark plugs and use them inasmuch as the threads in the casting are the same for each valve cap.

3—Almost any maker of pistons can supply you with comparatively light weight cast iron pistons. Try the Trindl Machine Works or Adapt Machine Co., Chicago, either of which can probably fit you out. Also the Bergesun-Skinner Corp., 67 E. 24th street, Chicago.

TROUBLE WITH FORD PISTONS

Q—When a 1919 Ford was first run it went well for about three weeks and then it began to slip, so the valves were ground, found a broken valve and replaced it with a new one. It went all right for a few days but the engine upon being stopped seemed to drag. A broken valve caused the trouble. A new piston and all new rings were installed and then the first two cylinders began to pump oil. We took them out and found that the cylinders were a little out of true. We lapped in new pistons and they fitted pretty tight. When we took the pistons out the first time we found some of the piston rings that had broken, but the other half we could not find. A clicking noise could be noticed in the engine for quite a while. When we took the engine down we found that the piece of ring was caught on the magneto and had killed three or four magnets. We had the magnets recharged and took the camshaft out and looked it over and it seemed to be O. K. Put new push rods in and have had the valves reseated and set perfect, also had new valve springs put in. When the new pistons were installed holes were drilled at the bottom and beveled the pistons so they would not pump oil any more. Now the engine does not seem to have any power and it makes a clicking noise at all times. It is most noticeable at about 25 m.p.h., the engine misses badly and seems to run uneven. Have used plenty of oil in the crankcase and have been putting a quart of oil to about 5 gal. gasoline, but it does not seem to help it. If the engine is run with that clicking noise will it be all right after the pistons get worked in, if plenty of oil is used? Do you think I should take them out and try putting new pistons in and not drill them?—M. H. Page, Providence, R. I.

In justice to the repairman, who seems to have done what was right, we believe you should run your car for some 500 miles in order to let it limber up and have the rings work in. If the noise develops with more intensity it will be time enough to stop and search further for the trouble.

No engine can work in under 500 miles and after that you will see improvement in power and also lack of trouble in pumping oil, for the rings and cylinder walls wil lbecome fitted and wear together. Do not forget, however, to change oil at about 250 miles, and to flush the crankcase with kerosene after draining and before putting in the new oil .

The skipping may be caused by several things and it will be well to look over the ignition system, particularly the timer and the coil. It is not infrequent that a wire will be loose and everything will go well for a while, and then the loose wire will permit a partial disconnection and a consequent disturbance in the firing.

It is noted that you installed new valves and some new valve springs. So far as the power and also the missing may be concerned, this may be caused by the valve stems being so tight in the guides as to cause them to stick, momentarily, particularly when heated. This, too, will disappear when worn in.

There is no better remedy than that followed by your repairman in handling the oil trouble, but until the rings and cylinder walls have adapted themselves to one another through some use of the car it is not at all surprising that oil will be passed.

DATA ON THE HAYNES

Q—What is the bore and stroke of a Haynes car, model 34.

2—What is the N. A. C. C. horsepower of same?

3—What is the maximum revolutions of engine?

4—Was this model equipped with aluminum pistons at factory?—S. A. Elliott, Hampton, Ga.

1—The model 34 had a bore of 3½ in. and a stroke of 5 in.

2—Under this formula the power would be 29.4.

3—1800 r.p.m.

4—Yes, the cars of the latter part of the series.

The Accessory Corner

New Fitments for the Car

Rayfield Carbureter for Fords

The Beneke & Kropf Mfg. Co., Chicago, manufacturers of the Rayfield carbureter are presenting an entirely new carbureter for Ford cars. The carbureter is of the venturi type and has an accelerating well and multiple jet nozzle. A patented thermostat air control is a feature of the carbureter that provides for the same operating temperature during all seasons of the year. The carbureter is sold complete with all fittings and replaces the Ford equipment. An adjustment for controlling the carbureter from the dash is provided along with the hot air stove, tubing, manifold, gaskets and cap screws. The list price is $18.

Bergougnan Tire

The Bergougnan tire made by the Bergougnan Rubber Corp., Trenton, N. J., has just been placed on the market. The company producing the tire is an outgrowth of the European Bergougnan interest, which is one of the largest tire producing companies in Europe. The new cord tire that the company is producing has a black tread with grey sidewalls. The tire is manufactured by the single cure process whereby each ply of cord fabric is thoroughly impregnated with high grade rubber. The Bergougnan cord tires are sold under an 8000-mile guarantee. The tire is being produced in all sizes up to 40 by 8 in. and the dealer organization is now being built up.

The Duplex visible gasoline dispensing system places before the view of the motorist the gasoline that drains from the device into the tank of his car. Two five gallon bottles are supported on the column and the outlet from these is controlled by a special valve. One bottle fills while the second one is being drained.

An added feature is that a visible dome is mounted on the top which is illuminated at night. These gasoline dispensing systems are manufactured by the Fleckenstein Visible Gasometer Co., Grand Rapids, Mich.

Griswold automatic shutter

L. & L. Transmission Lining

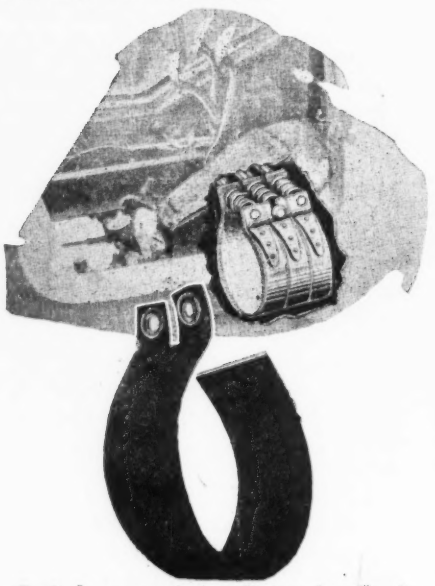
The L. & L. transmission lining for Ford cars is extremely novel in that only one band is used. This band is wide enough to cover the three drums of the Ford transmission and brake system. It is slipped into place as one piece. The flexibility of the material is enough to keep it from binding on the drums of the adjacent band, when one lever is depressed. No rivets are required for this brake lining. It merely slips into place with the metal protected ring eyes slipping over the nuts of the clamping screws. This transmission lining is made by the L. & L. Automobile Accessories Corp., 135 Church St., Hartford, Conn.

Griswold Automatic Shutter

The Griswold shutter shown in the illustration is an automatic temperature control device that is for application on air cooled motor cars only. The shutter is placed over the opening in the front of the hood and variation of the quantities of air admitted is effected through the thermostat. The shutters remain closed until the proper engine temperature is reached and then they open gradually as more air is needed to maintain the proper engine temperature. These shutters are easily installed and do not interfere with the hood when it is raised up in its elevated position when examination of the engine is being made. The device is made by the Thompson Mfg. Co., Des Moines, Ia.

Rayfield carbureter for Fords

Bergougnan cord tire which is sold under an 8,000 mile guarantee



L & L transmission lining for Fords

Service Equipment

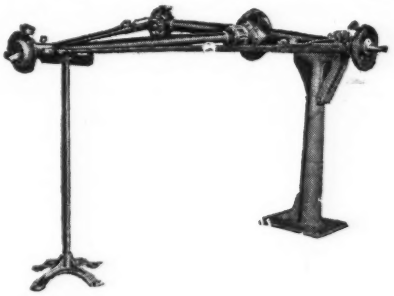
Time Savers of the Shop

Lipman Garage Pump

The Lipman Pump Wks., Beloit, Wis., are producing a great many air pumps that find a fitting use in front of the service station. The free air dispensing system for installation on the sidewalk in front of the service station is particularly attractive and serves as an advertising medium. The company is prepared to furnish these and also the air pumps which are installed in the service station. The pump shown in the illustration is of the four-cylinder type and is direct connected to the motor which drives it. This pump has sufficient capacity to directly inflate the tire when the hose is disconnected from the air stand.

Schmidt Internal Grinder

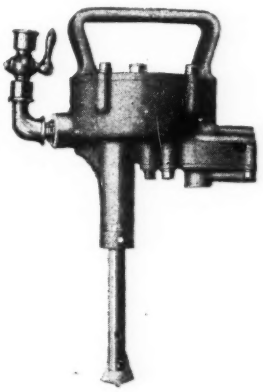
The B. L. Schmidt Co., Davenport, Ia., manufacturers of the Schmidt internal grinder are soon to put on the market an improved internal grinder, which the manufacturers claim contains a great many important developments. The new equipment will be universal in character although essentially designed for the grinding of all motor car truck and tractor cylinders. Its range will take in 2½ in. to 8 in. diameters and 20 in. depth. The new Schmidt internal grinder it is stated will be equipped for both wet and dry grinding, will be automatic in action and will have adjustment features of a very pronounced type.



The Miles rear axle stand which can be used on any car but is particularly well adapted to the Ford rear system

Miles Rear Axle Stand

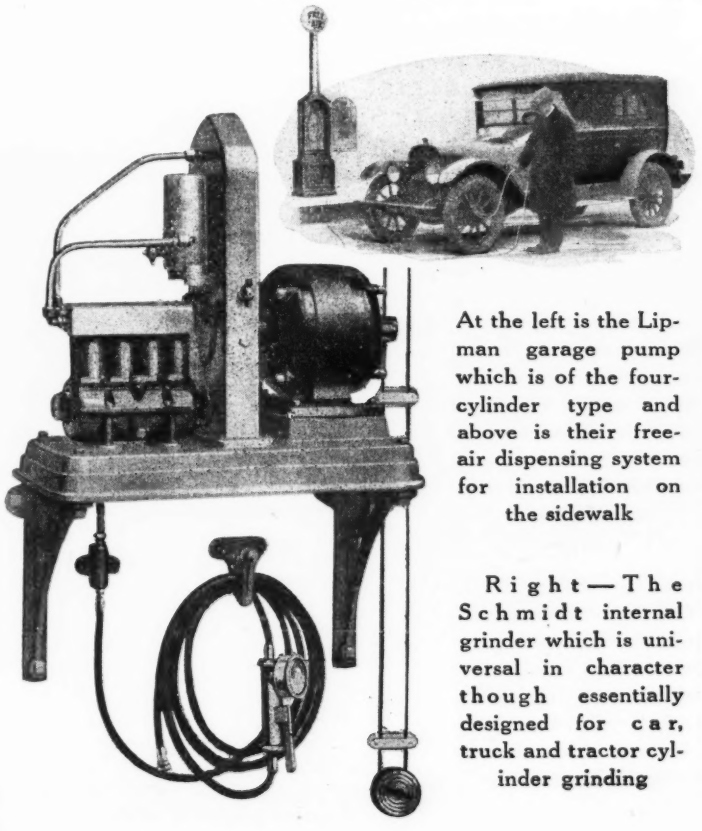
The rear axle stand shown in the illustration made by the Miles Mfg. Co., of Newton, Ia., is a stand that can be used on any type of rear axle but is particularly adaptable to the Ford rear system. It is small, portable, and can be packed away when not in use. It is light in weight and can be moved about by one man. The list price of this axle stand is $15.



Jackson pneumatic valve grinder that operates from the ordinary garage type air tank

Jackson Pneumatic Valve Grinder

The Jackson pneumatic valve grinder manufactured by the Kalamazoo Railway Supply Co., Kalamazoo, Mich., is a valve grinder that operates on the ordinary garage type air tank. No electrical connections are required, simply connect the grinder to the air hose from the air supply. The speed of the grinder is under the control of the operator at all times and can be varied from fifty to one thousand strokes per min. It has power enough to grind valves up to 3½ in. in diameter. Its weight is light being only four pounds. The casing of the grinder is constructed of aluminum alloy and all parts that oscillate operate in bronze bearings. The list price is $28.



At the left is the Lipman garage pump which is of the four-cylinder type and above is their free-air dispensing system for installation on the sidewalk

Right—The Schmidt internal grinder which is universal in character though essentially designed for car, truck and tractor cylinder grinding

Passenger Car Serial Numbers

Motor Age Maintenance Data Sheet No. 80

One of a series of weekly pages of information valuable to service men and dealers—Save this page

CHALMERS

Year	Model	Cyls.	Price	Serial Numbers
1912	9	4	$1400	18001-19252
	10	4	1800	20001-24000
	11	4	1500	27001-29166
	12	6	3250	24001-24300
	12	4	1750	4901- 4950
1913	16	4	1600	24301-25300
	17	4	1950	29500-33499
	18	6	2400	25301-27000
1914	24	6	2175	34500-38499
1915	26-A	6	1800	
	26-B	6	1850	
	Aug. 1, 1914		1700	38600-44999
	Sept. 1, 1914		1650	
	26-C	6	1550	45000-45799
	29	6	2400	45801-47300
	June 1, 1915		2175	

Serial numbers from here on are by **models** and not by **year**

	32-A	6	1400	47500-49599
	July 1, 1915		1275	
	32-B	6	1350	
	Aug. 1, 1915		1450	50600-56999
	April 1, 1916		1350	
	35-A	6	1050	55700-75699
	April 20, 1916		1090	
	35-B	6	1280	
	Jan. 1, 1917		1350	
	Nov. 1, 1917		1450	75700-82000
	Nov. 24, 1917		1535	
	April 8, 1918		1615	
	35-B	6	1765	
	July 12, 1919		1765	82000 up
	35-C	6	1250	
	Nov. 1, 1917		1365	
	Nov. 24, 1917		1485	94001 up
	April 8, 1918		1565	
	July 12, 1919		1685	

Number on 1915-16 models on left frame member under front boards. Number on 1916-17-18-19 models on left front horn of frame

CHAMPION (Formerly Direct Drive)

Year	Model	Cyls.	Price	Serial Numbers
1918	.....	4	.....	101-113 demonstrating models only
1919	C & CS	4	$1150	C-100—C216
1920	C-4	4	.....	C-300 up

Number plate on body under seat

CHANDLER

Year	Model	Cyls.	Price	Serial Numbers
1913	14	6	$1785	1-550
1914	15	6	1785	551-250
1915	15B	6	1295	2501-4000
1916	16	6	1295	4001-15000
1917	17	6	1295	15001-35000
1918	New Series	6	.....	35001-65000
1919	New Series	6	.....	65001 up
1920	New Series	6	1895	

Number on right front engine arm up to car number 72000; cars numbered above 72000 the serial number is on frame under right headlight and fender

CHEVROLET

Year	Model	Cyls.	Price	Serial Numbers
1913	C	6	$2100	
1914	H-2	4	750	
	H-4	4	875	
	L	6	1475	
	C	6	2500	
1915	H-2	4	750	
	H-4	4	875	
	L	6	1425	
1916	490	4	490	
	H-4	4	750	
1917	490	4	490	
	F-5	4	800	
	D-5	8	1385	
1918	490	4	635	
	FA-5	4	935	
	D-4	8	1385	
	D-5	8	1385	
1919	FA-5	4	1045	

As Chevrolet cars are numbered by manufacturing zones it is not possible to reproduce the numbers in such a way as to be of use to the dealer. In case of doubt write the Chevrolet Motor Co., 1764 Broadway, New York City

CHEVROLET (Continued)—

Year	Model	Cyls.	Price	Serial Numbers
	D-4	8	1385	
	D-5	8	1385	
	FB-5	4	1135	
	490	4	735	
1920	FB-50	4	1135	
	490	4	735	

CLEVELAND

Year	Model	Cyls.	Price	Serial Numbers
1919	40	6	$1385	1001 up
1920	.....	----	.....	Number plate on right hand frame members about 12 inches from frame; engine number front of crankcase under oil filler.

COLE

Year	Model	Cyls.	Price	Serial Numbers
1912	Large 4	4	.....	5000-7000
	Small 4	4	.....	5000-7000
1913	4-40	4	.....	9000-10000
	4-50	4	.....	7000-9000
	60-Big 6	6	.....	10000-11000
1914	Series 9	4	.....	16000-17012
	Series 9	6	.....	14000-15000
1915	660	6	.....	15000-15175
	666	6	.....	15175-16000
	Series 10	4	.....	18000-20000
	Series 10, Little 6	6	.....	20000-22000
	440	4	.....	22000-23000
	650, Sensible 6	6	.....	23000-24000
	651, Little 6	6	.....	24000-25000
	850	8	.....	27000-30000
1916	666, Big 6	6	.....	15175-16000
	860, Series 30	8	.....	30000-40000
1917	860, Series 40	8	.....	40000-50000
1918	870	8	.....	50000-59478
1919				
1920	870	8	.....	59339 up

Number on right front spring hanger and on under right front seat cushion

COLUMBIA

Year	Model	Cyls.	Price	Serial Numbers
1917	A	6	$1250	501-1310
	B	6	1345	1-297
1918	C	6	1350	2000-3199
	D	6	1450	501-889
	C-S	6	2445	1850-1950
1919	C	6	1600	3201-3389
	D	6	1745	1000-1132

Number on front seat heel board

	E	6	1845	101 up
	H	6	2850	100 up
	C-S	6	2445	1951-1968
1920	C	6	1695	4000 up
	D	6	1845	1400 up

Number on front toe board

	E	6	.....	
	C-S	6	2850	2000 up

Number on front toe board; engine numbers mixed

COMET

Year	Model	Cyls.	Price	Serial Numbers
1917-18	C-51	6	.....	1-500
1919	C-52	6	.....	500 up

Number plate on left hand side of dash under hood

COMMONWEALTH

Year	Model	Cyls.	Price	Serial Numbers
1913	38	4	$975	A1000-A1366
1914	38	4	975	B203-A411
	20	4	495	B001-B174
1915	38	4	1075	A966-B36
	20	4	495	C195-CX17
1916	32	4	895	CX2-C194
1917	40	4	995	D219-D479
1918	40	4	995	DX732-DO883
1919	40	4	1395	——— 41999
1920	40	4	1395	42000 up

Number plate on cowl

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 81

One of a series of weekly pages of information valuable to service men and dealer—Save this page

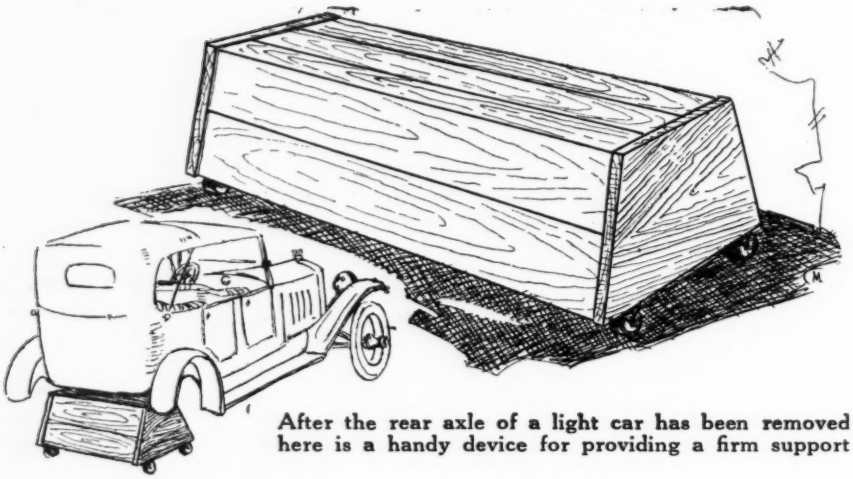
1919 Cars (Continued)

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Buick, H 6-44-45-46-47; H 6-49 & 50	Goodyear and U. S.	33x4 34x4½	.....	Split Dem. Split Dem. Demountable	Buick Std. Buick Std.
Cadillac, 57	Goodyear	34x4½ 35x5	S. S.	S. S. Dem	Kelsey
Case, U-50	Goodyear	35x4½	.....	Demountable	Stanweld
Chalmers, 6-30	Opt	32x4 on 5 Pass. 34x4 on 7 Pass.	S. S.	Demountable	Kelsey
Chandler	Goodyear Goodrich	33x4 Oversize 34x4½	Plain & Non-Skid	S. S.	Firestone Parker
Champion, K	.....	32x3½	S. S.	S. S.	Stanweld
Chevrolet, 490	Goodyear	30x3½	.....	Clincher	Perlman
Cole, 870	Goodrich Firestone Miller	33x5	S. S.	Demountable	Kelsey Goodrich Firestone
Columbia, F & G	Firestone	32x4	S. S.	Q. D.	Firestone
Comet, All	Goodyear	33x4	S. S.	S. S. Dem	Firestone
Commonwealth	Goodyear	32x3½	S. S.	Demountable	Stanweld
Crawford	.....	32x4	.....	E	Firestone
Crow-Elkhart, 32-34 & K-36	Firestone	32x3½	.....	S. S.	Firestone
Crow-Elkhart, H-36	Firestone	33x4	.....	S. S.	Firestone
Cunningham, V-3	Opt.	35x5	S. S.	.....	Firestone
Daniels, A & B	Goodyear	34x4½	Cord	S. S.	Firestone
Davis	Goodrich	34x4 34x4½	.....	.....	Firestone
Dixie-Flyer, HS-50	Fisk	32x4	S. S.	Stanweld	.....
Dispatch	.....	33x4	.....	Q. D. R.	Universal
Dodge Brothers	Goodrich Firestone Goodyear Cord	32x3½	S. S.	S. S.	Dodge Brothers
Dodge Brothers	U. S. Royal Cord	33x4	S. S.	S. S.	Dodge Brothers
Dorris, 6-60	Goodyear Cord	35x5 33x5	S. S.	Q. D. D.	Stanweld Firestone
Dort, 11	Goodyear	30x3½	Clincher	Demountable	Perlman
Douglas, G-5	Firestone	34x4	S. S.	Demountable	Firestone
Elcar, D-6	Firestone	33x4	S. S.	No. 21	Stanweld
Elcar, D-4	Firestone	32x3½	S. S.	No. 21	Stanweld
Elgin, H	Firestone or Goodyear	33x4	.....	S. S.	Firestone
Essex, A	Goodrich	32x4	.....	S. S.	Kelsey
Ford, T	.....	30x3½	Clincher	Clincher	Ford
Franklin, Series 9	Goodyear	32x4	S. S.	No rim cut detachable	Goodyear
Geronimo	Goodyear	32x4	.....	.....	.....
Glide, 6-40	Goodyear	34x4	S. S.	Demountable	Goodyear
Grant	.....	32x3½	.....	S. S.	Firestone
Hanson, 45	Goodyear Cord	32x4	S. S.	Split	Kelsey
Harroun, A-1	Portage	30x3½	.....	Demountable	.....
Hatfield, A	Firestone	32x4	.....	.....	.....
Haynes, 45 and 46	Firestone U. S. Goodyear	34x4½	S. S.	Heavy type E No hook type wire	Firestone Goodyear
Holmes	Goodyear Cord	34x4½	.....	Demountable E Demountable	Firestone Stanweld
Hudson, O	Goodrich	34x4½	S. S.	.....	Kelsey
Hupmobile, R	Goodyear	32x4	S. S.	Demountable	Kelsey
Jones, 28-A & B	Goodrich	34x4	S. S.	S. S.	Firestone
Jones, 28-E	Goodrich Cord	32x4½	S. S.	S. S.	Firestone
Jordan, F	Goodyear	32x4½	Cord	E	Firestone
King, G	Firestone	35x4½ 32x4½	.....	Demountable	Stanweld
Kissel Kar	Goodyear Cord	32x4½	.....	.....	.....
Kline Kar, 6-42-H	Goodyear	33x4	S. S.	E light	Firestone
Lexington, 6-R	Goodyear	34x4	S. S.	Demountable	Kelsey
Locomobile, M	Goodyear, S. S.	35x5	.....	Q. D. D.	Firestone

ABBREVIATIONS:
S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

The Automotive Repair Shop

Practical Maintenance Hints



After the rear axle of a light car has been removed here is a handy device for providing a firm support

Straightening Devices

There is a special need in all motor car repair shops for devices of the sort shown herewith in the illustration and as these equipments were made by the shop employes, they should be of interest to those who make a portion of their shop tools.

The test centers shown are very simple to make. Two short lengths of ⅝x2 in. make the center holders and clamp in one place. Common machine steel bolts with their threaded ends ground to a center point and case hardened from the centers. Any length of shaft or work may be tested for trueness on these centers.

After the work is marked at the place it is bent, then some reliable means must be at hand to straighten the work. For this, a rig made as shown in sketch from a section of small shop car track and some flat bar stock for the strong back housings or frame. The sketch explains more clearly the details of the construction than is possible by printed description. A small screw jack is used under the end of the beam or section of track as a means of operating the straightening lever. The work is placed in V blocks and the beam adjusted for correct leverage and then pressure applied. This rig preferably should be set up on a very rugged bench but lacking this it can be placed on the shop floor.

Rear Support for Fords

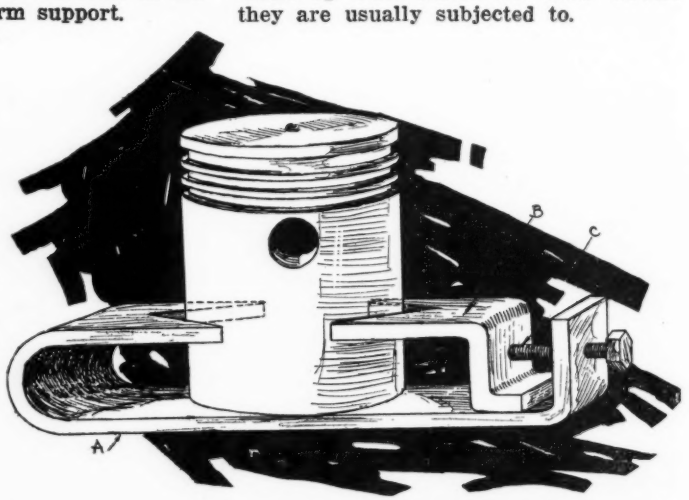
It often happens that after a rear axle has been removed from a car it is necessary to move the car. For ordinary work a special jack made for the purpose is recommended but for light cars such as Fords one service superintendent pins his faith to the wooden box like structure mounted on four casters illustrated. It is slid in place under the rear of the car and provides a firm support.

Easily Made Piston Vise

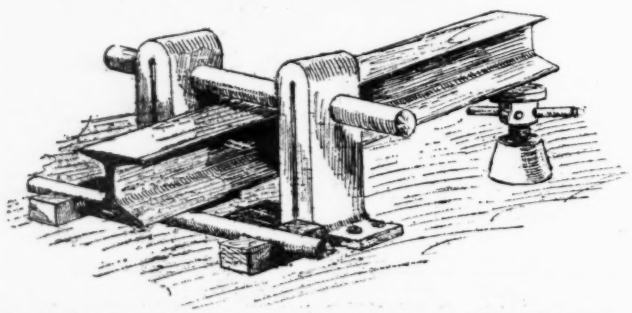
A simple efficient form of piston vise is shown herewith in the sketch. This tool was designed to meet the need on the shop bench of an inexpensive device for the gripping of engine pistons of variable diameters. The tool is made of two pieces of ⅝x5-in. plate. The lower section A forms the stationary jaw and frame of the vise by the simple task of cutting first the V slot and then bending the piece to the shape shown. The moving jaw B is equally easy to make. A common machine bolt is used for a jaw operating screw and the position of the screw is such that the section C of the jaw B is guided and steadied by it. The device is secured to the work bench by countersunk head bolts through the base of the frame. As there is need of several of these vises on a busy shop bench, this simple cheap design may have interest for those who improvise part of their shop equipment.

Long Lived Creeper

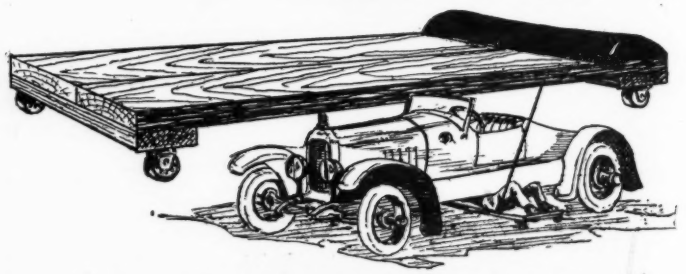
A creeper which has for its foundation a 1½ in. plank of hard-wood is recommended for its wearing qualities. Each end is reinforced with cross-pieces to which the casters are attached and there is the usual pillow at one end. A creeper of these specifications should stand up well under the hard service they are usually subjected to.



A simple and efficient piston vise designed to meet the need of an inexpensive device for gripping pistons of variable diameters

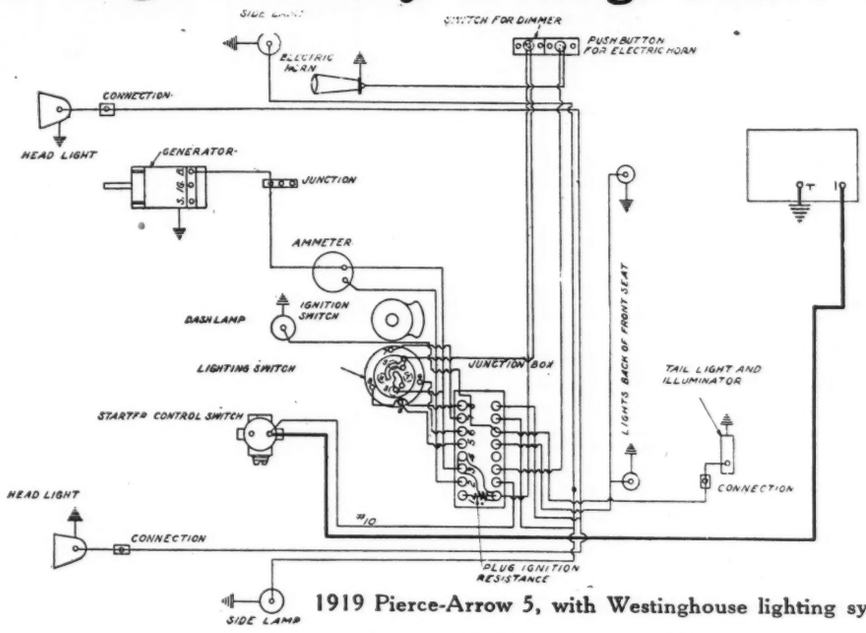


Straightening device for which there is special need in all automotive repair shops

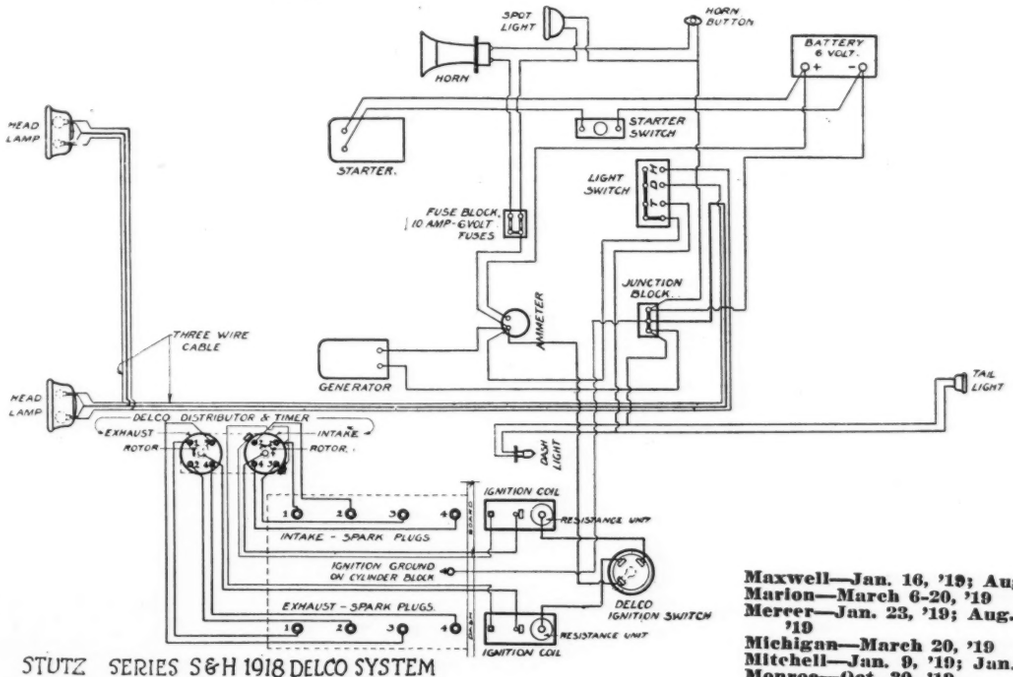


A creeper that will stand a lot of hard service

Motor Age Weekly Wiring Chart No. 63



1919 Pierce-Arrow 5, with Westinghouse lighting system



STUTZ SERIES S&H 1918 DELCO SYSTEM

THIS WEEK

1919 Pierce-Arrow & Stutz

Abbott—March 20-27, '19
Alco—April 24, '19
Allen—Dec. 18, '19
Alter—Nov. 14, '18
Apperson—March 6, '19
Auburn—Nov. 27, '19
Briscoe—Oct. 16, '19
Buick—Nov. 21, '18; April 3, '19; Oct. 23, '19
Cadillac—Dec. 19, '18
Cartercar—May 1, '19
Case—Feb. 27, '19; Oct. 2, '19
Chalmers—Feb. 20, '19; March 27, '19; Nov. 27, '19
Chandler—April 3, '19
Chevrolet—Nov. 28, '18; March 27, '19
Cole—Jan. 23, '19; April 3, '19
Crow-Elkhart—June 26, '19
Cutting—Nov. 6, '19
Daniels—May 8, '19; Dec. 4, '19
Davis—May 8, '19; Dec. 4, '19
Detroiter—March 6, '19
Dodge—Dec. 12, '18
Dorris—Dec. 11, '19
Dort—March 13, '19
Elgin—Feb. 27, '19
Empire—March 13, '19; Oct. 30, '19
Essex—Oct. 23, '19
Ford—Jan. 30, '19; Feb. 6, '19; May 15, 22, '19
Franklin—June 19, '19; Dec. 11, '19
General Battery Charging—May 29, '19; Sept. 25, '19
General Magneto Diagram—June 5, '19
Grant—Feb. 27, '19; March 27, '19
Haynes—Sept. 4, '19; Oct. 9, '19
Henderson—April 3, '19
Hudson—Dec. 5, '18; May 1, '19
Hupmobile—Feb. 13, '19; Oct. 16, '19
Internal Connections—July 10-17-24, '19
Interstate—March 13, '19
Keeton—Nov. 6, '19
King—July 3, '19
Kissel—July 3, '19
Krit—Feb. 6, '19
Lexington—April 24, '19; Jan. 1, '20
Liberty—Jan. 1, '20
Little—March 20, '19
Locomobile—Jan. 23, '19; April 17, '19
Marmon—Jan. 9, '19; Dec. 25, '19; Jan. 22, '20
Maxwell—Jan. 16, '19; Aug. 14, '19
Marion—March 6-20, '19
Mercer—Jan. 23, '19; Aug. 28, '19; Nov. 27, '19
Michigan—March 20, '19
Mitchell—Jan. 9, '19; Jan. 8, '20
Monroe—Oct. 30, '19
Moon—Jan. 29, '20
Murray—May 1, '19
National—June 19, '19
Oakland—Jan. 2, '19; Oct. 16, '19
Oldsmobile—Jan. 23, '19
Olympian—Jan. 22, '20
Overland—Nov. 7-14, '18
Owen-Magnetic—Sept. 18, '19
Packard—June 19, '19; July 31, '19
Paige—July 3, '19
Paterson—March 20, '19; June 26, '19; July 9, '19
Pierce-Arrow—Oct. 2, '19
Premier—April 10, '19
Pullman—April 10, '19
Regal—Feb. 6, '19; April 10, '19
Reo—Feb. 27, '19; Aug. 21, '19; Oct. 9, '19; Nov. 13, '19
Saxon—April 17, '19
Scripps-Booth—Dec. 28, '18; Jan. 15, '20
Simplex—April 17, '19
Stanley—June 26, '19
Stearns-Knight—April 24, '19; Jan. 8, '20
Studebaker—Dec. 26, '18; Dec. 25, '19
Stutz—Jan. 23, '19
Templar—Jan. 29, '20
Velie—April 24, '19; Sept. 25, '19
Westcott—May 8, '19; Jan. 15, '20
White—Sept. 25, '19
Special Systems for Fords—May 15-22, '19

Motor Age Monthly Passenger Car Specification Tables

These prices apply to five and seven-passenger models only—These tables are revised and brought up to date monthly

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carbureter Size and Make	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Allen 43	5	1495	110	32x4	Miller	3½x5	Own	4	19.6	1—Strom	Vacuum	B. and B.	Own	Detroit	Columbia	Ditweiler	Stewart	Firestone	6-8	90	Prest.	A-L	A-L	.....	6-8	llen 43
American	7	1865	122	32x4	.....	3½x5	Ruten.																			American
American Beauty	5	2150	121	33x4	Firestone	3½x4½	Cont.	6	25.35	1½—Ray.	Vacuum	B. and B.	Detroit	Acme	Timken	Standard	Warner	Firestone	6	110	Willard	West.	West.	A-K	6	American Beauty
Anderson Series 30	7	....	120	33x4	Goodrich	3½x4½	Cont.	6	25.35	Ray.	Vacuum	B. and B.	Durston	Ther-H	Salisbury	Jacox	Stewart	Firestone	6	90	Willard	Remy	Remy	Remy	6	Anderson Series 30
Apperson Anniversary	7	4000	130	34x4½	U. S.	3½x5	Own	8	33.80	1¼—John.	Vacuum	Own	Own	Sterling	Own	Own	V. Sicklen	Firestone	6	110	Willard	Bijur	Bijur	Remy	6	Apperson Anniversary
Apperson 8-20	7	2950	130	34x4½	Goodyear	3½x5	Own	8	33.80	1¼—John.	Vacuum	Own	Own	Sterling	Own	Own	V. Sicklen	Firestone	6	110	Willard	Bijur	Bijur	Remy	6	Apperson 8-20
Argonne	4	4750	128	32x4	Goodrich	3½x5½	Own	4	22.50	—Ray.	Vacuum	.....	.....	Opt.	.....	.....	Waltham	Houk	12	15	Exide	West.	Own	Eise.	12	Argonne
Auburn 6-39	5	1795	120	33x4	Goodrich	3½x4½	Cont.	6	25.35	1—Ray.	Vacuum	B. and B.	G-L	Hart.	Col.	Jacox	Stewart	Firestone	6	80	Willard	Remy	Remy	Remy	6	Auburn 6-39
Beggs 6	5	1630	120	33x4	Goodrich	3½x4½	Cont.	6	25.35	1—Strom.	Vacuum	B. and B.	Detroit	Arvac.	Timken	Ditweiler	Stewart	Firestone	6	100	Willard	A-L	A-L	Conn.	6	Beggs 6
Bell	5	1395	114	31x4	Miller	3½x4½	G. B. & S.	4	22.50	1—Strom.	Vacuum	.....	Muncie	Hart	Peru	Warner	Stewart	Firestone	6	.....	Prest.	A-L	.....	A-K	6	Bell
Biddle B	4	3950	121	32x4	Firestone	3½x5½	Buda	4	22.50	1¼—Zen.	Vacuum	Warner	Warner	Spicer	Stan-Par	Gemmer	Warner	.....	6	90	Phila.	G. & D.	G. & D.	Simms	6	Biddle B
Bour Davis 20	5	1750	118	32x4	Goodyear	3½x4½	Cont.	6	25.35	1—Strom.	Vacuum	B. and B.	Detroit	Mechanics	Salisbury	C. A. S.	Stewart	Perlman	6	125	Willard	Remy	Remy	Remy	6	Bour-Davis 20
Bour-Davis 21 S. & R.	7	2375	126	33x4½	Goodyear	3½x5½	Cont.	6	29.40	1¼—Zen.	Vacuum	Muncie	Muncie	Spicer	Salisbury	C. A. S.	Stewart	Firestone	6	115	Willard	West.	West.	West.	6	Bour-Davis 21 S. & R.
Brewster	4	8100	125	34x4½	Kelly-S	4x5½	Own	4	25.60	1¼—Strom.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	12	80	U. S. L.	U. S. L.	U. S. L.	Berl.	.....	Brewster
Briscoe 4-34	5	1285	109	31x4	optional	3½x5	Own	4	18.23	1—Buick	Gravity	Own	Own	Own	Own	Own	Stewart	.....	6	80	Prest.	A-L	A-L	Conn.	6	Briscoe 4-34
Buick H-45	5	1495	118	33x4	Goodyear	3½x4½	Own	6	27.34	Mar.	Vacuum	Own	Own	.....	Own	Own	A-C	Own	6	80	Willard	Delco	Delco	Delco	6-8	Buick H-45
Buick H-49	7	1785	124	34x4½	Goodyear	3½x4½	Own	6	27.34	Mar.	Vacuum	Own	Own	.....	Own	Own	A-C	Own	6	80	Willard	Delco	Delco	Delco	6-8	Buick H-49
Cadillac 57	7	3490	125	35x5	Goodyear	3x5½	Own	8	31.25	1½—Own	Pressure	Own	Own	Spicer	C-Timk.	Own	V. Sicklen	Kelsey	6	.....	Exide	Delco	Delco	Delco	6-3	Cadillac 57
Cameron 55	5	2000	118	32x4	.....	3x4½	Own	6	20.65	1—Own	Vacuum	B. and B.	Own	.....	Own	.....	.....	.....	6	100	Exide	Bijur	Bijur	Conn.	6	Cameron 55
Case V	7	2400	126	34x4½	Goodyear	3½x5½	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	G-L	Arco	Col.	Jacox	V. Sicklen	Firestone	6	125	Willard	West.	West.	Delco	6	Case V
Chalmers 35-C	5	1795	117	32x4	optional	3½x4½	Own	6	25.35	1¼—Strom.	Vacuum	Own	Own	U. M. Co.	Timken	Own	Stewart	Kelsey	6	106	Prest.	A-L	A-L	Remy	6	Chalmers 35-C
Chalmers 35-B	7	1945	122	33x4½	optional	3½x4½	Own	6	25.35	1¼—Strom.	Vacuum	Own	Own	U. M. Co.	Timken	Own	Stewart	Kelsey	6	106	Prest.	A-L	A-L	Remy	6	Chalmers 35-B
Champion C-4	5	1250	116	32x3½	Goodrich	3½x5	Lyco.	4	19.60	1—Zen.	Vacuum	B. and B.	G-L	.....	Peru	C. A. S.	Stewart	Stanweld	6	.....	Willard	Delco	Delco	Delco	6	Champion C-4
Champion S-4	5	1395	118	32x4	Goodrich	3½x5	H-S	4	19.60	1—Carter	Vacuum	B. and B.	G-L	.....	Peru	C. A. S.	V. Sicklen	Stanweld	6	.....	Prest.	Dyn.	Dyn.	A-K	6	Champion S-4
Chandler	7	1895	123	33x4	Goodrich	3½x5	Own	6	29.40	1½—Ray.	Vacuum	B. and B.	Own	Hartford	Own	Gemmer	Stewart	Firestone	6	120	Prest.	G. & D.	G. & D.	Bosch	6	Chandler
Chevrolet 4-90	5	735	102	31x4	Goodyear	3½x4	Own	4	21.76	1½—Zen.	Gravity	Own	Own	Own	Own	Warner	Stewart	Perl-Jack.	6	80	Willard	A-L	A-L	Simms	6	Chevrolet 4-90
Chevrolet F. B.	5	1235	110	33x4	Goodyear	3½x5½	Own	4	21.76	1½—Zen.	Vacuum	Own	Warner	Own	Own	Warner	Stewart	Perl-Jack.	6-8	120	Willard	A-L	A-L	Simms	6	Chevrolet F. B,
Cleveland 40	5	1385	112	32x4	Goodrich	3x4½	Own	6	21.60	1—Strom.	Vacuum	B. and B.	Mechanics	Mechanics	Own	Ditweiler	V. Sicklen	Firestone	6	94	Prest.	G. & D.	G. & D.	Bosch	6	Cleveland 40
Cole Aero Eight 870	7	2850	127	33x5	Firestone	3½x4½	North.	8	39.20	1½—John.	Vacuum	North.	North.	Spicer	Col.	Gemmer	Stewart	Firestone	6	50	Prest.	Delco	Delco	Delco	6	Cole Aero Eight 870
Columbia C	5	1795	115	32x4	Firestone	3½x4½	Cont.	6	25.35	1—Strom.	Vacuum	B. and B.	Durston	Spicer	Timken	Gemmer	Stewart	Firestone	6	80	Prest.	A-L	A-L	A-K	6	Columbia C
Comet C-53	5	2150	125	33x4½	Firestone	3½x5½	Cont.	6	29.40	1½—Strom.	Vacuum	B. and B.	Muncie	Arvac	Col.	Gemmer	Stewart	Firestone	6	120	Willard	Wagner	Wagner	Wagner	6	Comet C-53
Commonwealth 4-40	5	1395	117	32x4	Goodrich	3½x5	Lyco.	4	19.60	1—Carter	Vacuum	B. and B.	G-L	Detroit	Peru	C. A. S.	V. Sicklen	Stanweld	6	105	Prest.	Dyn.	Dyn.	A-K	6	Commonwealth 4-40
Crow-Elkhart L-55-4	5	1295	117	32x3½	Firestone	3½x5	Lyco.	4	19.60	⅞—Zen.	Vacuum	B. and B.	Covert	Ther-H	Peru	Ditweiler	Stewart	Jaxon	6	80	Exide	Dyn.	Dyn.	Conn.	6	Crow-Elkhart L-55-4
Crow-Elkhart H-55-6	5	1545	117	33x4	Firestone	3½x5	Ruten.	6	23.4	—Zen.	Vacuum	B. and B.	Covert	Ther-H	Peru	Ditweiler	Stewart	Jaxon	6	80	Exide	Dyn.	Dyn.	Conn.	6	Crow-Elkhart H-55-6
Cunningham V-3	7	....	132	35x5	optional	3½x5	Own	8	45.00	1½—Strom.	Vacuum	B-L	Own	Spicer	Timken	Gemmer	Warner	Firestone	6	120	Willard	West.	West.	Delco	6	Cunningham V-3
Daniels D	7	4500	132	34x4½	optional	3½x5½	Own	8	39.20	1¼—Zen.	Pressure	Own	Own	Spicer	Timken	Gemmer	Stewart	Firestone	6	145	Willard	Delco	Delco	Delco	6	Daniels D
Davis 51	5	1985	120	33x4	Goodrich	3½x4½	Cont.	6	25.35	1¼—Strom.	Vacuum	B. and B.	Warner	Arvac	Salisbury	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Davis 51
Dixie Flyer H-S-50	5	1465	112	32x4	Fisk	3½x5	H-S	4	16.90	1—Strom.	Vacuum	B. and B.	G-L	Ther H	Peru	C. A. S.	V. Sicklen	Standard	6	80	Willard	Dyn.	Dyn.	Conn.	6	Dixie Flyer H-S-50
Dodge Brothers	5	1085	114	32x3½	optional	3½x4½	Own	4	24.03	1½—Stew.	Vacuum	Own	Own	Own	Own	Own	J. Man.	Own	12	50	Willard	N. E.	.....	Own	12	Dodge Brothers
Dorris 6-80	7	4350	132	33x5	Goodyear	4x5	Own	6	38.40	1½—Strom.	Vacuum	Warner	Warner	Spicer	Timken	Ross	V. Sicklen	.....	6	103	Willard	West.	West.	Bosch	6	Dorris 6-80
Dort 15	5	985	105½	30x3½	Goodyear	3½x5	D-Lyco.	4	19.60	1—Carter	Vacuum	Own	Mechanics	Mechanics	Flint	Jacox	Stewart	Cleveland	6	95	U. S. L.	West.	West.	Conn.	6	Dort 15
du Pont A	5	4000	124	32x4½	.....	3⅛x5⅛	Own	4	24.75	.....	Vacuum	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	du Pont A
Economy 6-46	5	1795	115	33x4	.....	3½x4½	Cont.	6	25.35	1—Zen.	Vacuum	B. and B.	Durston	.....	Salisbury	Ditweiler	Stewart	Firestone	6	90	Willard	A-L	A-L	Conn.	6	Economy 6-46
Elcar 6	5	1595	116	33x4	Firestone	3½x4½	Cont.	6	25.35	1¼—Strom.	Vacuum	B. and B.	Muncie	Peters	Salisbury	C. A. S.	Stewart	Stanweld	6	90	Willard	Delco	Delco	Delco	6	Elcar 6
Elcar 4	5	1395	116	33x4	Firestone	3½x5	Lyco.	4	19.60	1—Strom.	Vacuum	B. and B.	Muncie	Peters	Salisbury	C. A. S.	Stewart	Stanweld	6	90	Willard	Delco	Delco	Delco	6	Elcar 4

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McTeetor-McFarlan; #, Monson or Duesenberg; R. & V., Root F., & Van Dervoort. **Carburetor**—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley- Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor;** —A-L., Auto-Lite; West., Westinghouse; #, Westinghouse or Auto-Lite; W-L., Ward Leonard; Dyn., Dyneto; N. E., North East; L-N., Leece-Neville; A-C., Allis-Chalmers; Split., Splitdorf; S-H., Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K., Atwater-Kent, **Conn.**, Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W., Bosch-Westinghouse; Split, Splitdorf. **Gearset**—G-L., Grant-Lees; North., Northway; B-L., Brown-Lipe. **Rear Axle** —Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Manville; V-Sicklen, Van Sicklen; **A-C.** Allis-Chalmers.

Allis-Chalmers.

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. H.P.	Carbureter Size and Make	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Elgin Series K	5	1665	118	33x4	optional	3½x4½	Falls	6	23.44	1—Strom.	Vacuum	B. and B.	Mechanics	Mechanics	Col.	C. A. S.	V. Sicklen	Firestone	6	90	Willard	Wagner	Wagner	Wagner	6	Elgin Series K
Essex A	5	1495	108½	32x4	optional	3⅜x5	Own	4	18.23	1¼—Own	Vacuum	Own	Own	Spicer	Timken	Gemmer	Stewart	Kelsey	6	105	Exide	Delco	Delco	Delco	6	Essex A
Ferris	6	3390	130	32x4½	.....	3½x5½	.....	6	29.40	—Zen.	Vacuum	B. and B.	.....	.....	Col.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Ferris
Ford T	5	525	100	30x3½	.....	3⅜x4	Own	4	22.50	1—H-K	Gravity	Own	Own	Own	Own	Own	.....	.....	6	80	None	Own	Own	Own	6	Ford T
Franklin 9	5	2750	115	32x4	Goodyear	3½x4	Own	6	25.35	1—Own	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	.....	12	60	Willard	Dyn.	.....	A-K	12	Franklin 9
Gardner	5	1125	112	32x3½	Goodyear	3½x5	Own	4	19.60	1—Carter	Vacuum	B. and B.	Mechanics	Peters	W-Weiss	Ditweiler	Stewart	Jaxon	6	87	Willard	West.	West.	West.	15	Gardner
Geronimo	5	1995	122	32x4	Goodyear	3½x5	Ruten.	6	23.44	1—Strom.	Vacuum	B. and B.	G-L	Hart	Flint E	C. A. S.	Stewart	Firestone	6	88	Willard	Dyn.	Dyn.	Delco	6	Geronimo
Grant H	5	1595	116	32x4	optional	3 1/16x4½	Walker	6	22.52	1—Strom.	Vacuum	B. and B.	Durston	Spicer	Columbia	Jacox	V. Sicklen	Firestone	6	90	Prest.	Bijur	Bijur	A-K	6	Grant H
Hanson 54	5	2165	119	32x4	optional	3½x4½	Cont.	6	25.35	—Strom.	Vacuum	B. and B.	Covert	Detroit	Timken	Gemmer	Stewart	Kelsey	6	80	Prest.	A-L	A-L	Remy	6-8	Hanson 54
Harroun A-A-2	5	995	106	30x3½	Miller	3½x5½	Own	4	16.90	1—Strom.	Vacuum	Own	G-L	Own	Adams	Lavine	Stewart	Stanweld	6	80	Prest.	Remy	Remy	Remy	6	Harroun A-A-2
Harvard 4-20	2	850	100	28x3	.....	3x4¼	.....	4	14.40	⅞—Zen.	Gravity	.....	.....	Blood	.....	Barnes	.....	.....	6	.....	Nat'l	Wagner	Wagner	A-K	6-3	Harvard 4-20
Hatfield A-42	5	1695	115	32x4	Firestone	3½x5	H-S	4	16.90	1—Zen.	Vacuum	B. and B.	G-L	Spicer	Col.	.....	Stewart	Firestone	6	.....	Willard	Dyn.	Dyn.	Conn.	6	Hatfield A-42
Haynes 46	7	3450	127	34x4½	optional	2⅞x5	Own	12	36.30	1½—Ray.	Vacuum	B. and B.	Own	Arvac	Own	Jacox	Warner	Houk	6	120	Willard	L-N	L-N	Delco	6	Haynes 46
Haynes 45	7	2685	127	34x4½	optional	3½x5	Own	6	29.40	1½—Ray.	Vacuum	B. and B.	Own	Arvac	Own	Jacox	Stewart	Firestone	6	120	Willard	L.N	L-N	King	6	Haynes 45
H. C. S. Special	4	2950	120	32x4½	Goodrich	3⅝x5½	Weid.	4	21.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	H. C. S. Special
Hollier 206-B	5	1985	120	33x4	Goodrich	3½x4½	Cont.	6	25.35	1—Zen.	Vacuum	Fuller	Fuller	Own	Own	Warner	Stewart	Firestone	6	80	U. S. L.	West.	West.	West.	6	Hollier 206-B
Holmes	7	3100	126	34x4½	Goodyear	3½x4½	Own	6	29.40	1—Newc.	Vacuum	B-L	B-L	Spicer	Timken	Gemmer	V. Sicklen	Firestone	12	100	Willard	Dyn.	Dyn.	Eise.	12	Holmes
Hudson O	7	2200	125	34x4½	optional	3½x5	Own	6	29.40	1½—Own	Vacuum	Own	Own	Spicer	Timken	Gemmer	Stewart	Kelsey	6	105	Exide	Delco	Delco	Delco	6	Hudson O
Huffman W	5	1795	120	32x4	Firestone	3½x4½	Cont.	6	25.35	—Scheb.	Vacuum	B. and B.	Covert	.....	Salisbury	Ditweiler	Stewart	Firestone	12	90	Willard	Dyn.	Dyn.	Conn.	6	Huffman W
Hupmobile R-3	5	1450	112	32x4	Goodyear	3½x5½	Own	4	16.90	1—Strom.	Vacuum	Own	Own	Detroit	Own	Jacox	V. Sicklen	Kelsey	6	90	Willard	West.	West.	A-K	6	Hupmobile R-3
Jackson 6-38	5	1885	121	33x4	Goodyear	3½x4½	Cont.	6	25.35	1½—Strom.	Vacuum	B. and B.	Covert	Detroit	Salisbury	Own	Stewart	Jaxon	6	94	U. S. L.	A-L	A-L	Remy	6	Jackson
Jones 28	7	2250	126	34x4	Goodrich	3½x5½	Cont.	6	29.40	1½—Ray.	Vacuum	B. and B.	G-L	Arvac	Stan-Par	C. A. S.	Stewart	Firestone	6	120	Prest.	A-L	A-L	A-L	6	Jones 28
Jordan F	7	2775	127	32x4½	Goodyear	3½x5½	Cont.	6	29.40	1½—Strom.	Vacuum	Detroit	Detroit	Spicer	Timken	Gemmer	V. Sicklen	Firestone	6	117	Willard	Delco	Delco	Delco	6	Jordan F
Jordan M	5	2550	120	32x4	Goodyear	3½x4½	Cont.	6	25.35	1½—Strom.	Vacuum	Detroit	Detroit	Spicer	Timken	Gemmer	V. Sicklen	Firestone	6	94	Willard	Delco	Delco	Delco	6	Jordan M
King H	7	2585	120	32x4½	optional	3x5	Own	8	28.80	1½—Ball	Vacuum	Detroit	Own	Ther-H	Col.	Jacox	V. Sicklen	Standard	6	120	Prest.	West.	West.	.....	6	King H
Kissel	7	2975	124	32x4½	Goodyear	3 7/16x5½	Own	6	26.75	1½—Strom.	Vacuum	Warner	Warner	Spicer	Own	Jacox	Stewart	Firestone	6	120	Willard	Remy	Remy	Remy	6	Kissel
Klinekar 6-55-J	5-7	1990	121	33x4	.....	3½x4½	Cont.	6	25.35	1½—Ray.	Vacuum	B. and B.	G-L	.....	Standard	Wohlrab	Stewart	Firestone	6	90	Prest.	Wagner	Wagner	Conn.	6	Klinekar 6-55-J
Lafayette	7	....	132	33x5	Firestone	3½x5½	Own	8	33.80	1⅞—Own	Pressure	Own	Own	.....	Own	Own	Waltham	Firestone	6	.....	Exide	Delco	Delco	Delco	6-8	Lafayette
Leach	5-7	4300	126½	32x4½	Goodyear	3½x5½	Cont.	6	29.40	—Ray.	.....	B-L	B-L	Spicer	Timken	Liberty	.....	.....	.....	.....	Prest.	.....	West.	.....	.....	Leach
Lexington S-20	5	1885	122	32x4	optional	3½x4½	Cont.	6	25.35	1½—Ray.	Vacuum	B. and B.	Warner	Hardy	Own	C. A. S.	Stewart	Kelsey	6	100	Willard	G-D	G-D	Conn.	6	Lexington S-20
Liberty 10-C	5	1695	117	32x4	Goodyear	3½x5	Cont.	6	23.44	1—Strom.	Vacuum	B. and B.	Detroit	Spicer	Timken	Gemmer	Stewart	Firestone	6	90	Willard	Wagner	Wagner	Wagner	6	Liberty 10-C
Locomobile 48	7	8100	142	35x5	optional	4½x5½	Own	6	48.60	1½—Own	Pressure	Own	Own	Own	Own	Own	Stewart	Firestone	6	140	Exide	West.	West.	Berl.	6	Locomobile 48
Lorraine	5	1425	114	32x4	Republic	3½x5	H-S	4	19.60	1—John.	Vacuum	B. and B.	G-L	Acme	Standard	Gemmer	Stewart	Stanweld	6	94	U. S. L.	West.	West.	West.	6	Lorraine
Maibohm B	5	1395	116	32x4	Fisk	3½x4½	Falls	6	23.44	1—Strom.	Vacuum	B. and B.	Muncie	Mechanics	Peru	Bucyrus	Stewart	Stanweld	6	94	Willard	Bijur	Bijur	A-K	6	Maibohm B
Marmon 34	7	4650	136	32x4½	optional	3⅞x5½	Own	6	33.75	1⅞—Strom.	Gravity	Own	Own	Own	Own	Own	V. Sicklen	.....	6	162	Willard	Delco	Delco	Delco	6	Marmon 34
Marshall K	5	1295	118	32x3½	Firestone	3½x5	Lyco.	4	19.60	1—Zen.	Vacuum	B. and B.	G-L	Spicer	Peru	Gemmer	Stewart	Firestone	6	160	Willard	Dyn.	Dyn.	Delco	6	Marshall K
Maxwell 25	5	1055	109	30x3½	U. S.	3⅜x4½	Own	4	21.03	1—John.	Vacuum	Own	Own	Own	Own	Own	Stewart	Jaxon	12	80	Prest.	S-H	S-H	A-K	12	Maxwell 25
McFarlan 127	7	4800	136	35x5	Goodrich	4½x6	T-McF	6	43.60	1½—Strom.	Vacuum	B. and B.	B-L	Spicer	Timken	Warner	Stewart	Firestone	6	120	Willard	West.	West.	Bos-W.	6	McFarlan 127
Mercer Series 5	6	4950	132	32x4½	optional	3⅞x6¾	Own	4	22.50	1½—Ball	Vacuum	Own	Own	Spicer	Own	Gemmer	Warner	Howard	6	182	Willard	West.	West.	Berl.	6	Mercer Series 5
Meteor K, R	4	5000	129	32x4½	optional	4x6	Duesen.	4	25.60	1½—Zen.	Vacuum	B. and B.	Own	.....	Standard	Gemmer	Warner	.....	6	.....	Willard	Bijur	Bijur	Simms	6	Meteor K, R
Metz Master 6	5	1895	120	32x4	Goodrich	3½x5	Ruten.	6	23.44	1—Strom.	Vacuum	B. and B.	B-L	Hart	Timken	Warner	Stewart	Firestone	6	110	Willard	West.	West.	Conn.	6	Metz Master 6
Mitchell F-40	5	1750	120	33x4	.....	3½x5	Own	6	25.35	1½—Ray.	Vacuum	B. and B.	Own	Own	Own	Own	Stewart	Stanweld	6	94	Willard	Remy	Remy	Remy	6	Mitchell F-40
Monitor M. & O	5	1575	117	33x4	Miller	3½x4½	Cont.	6	25.35	1—Strom.	Vacuum	B. and B.	G-L	.....	Stanweld	C. A. S.	Stewart	Stanweld	6	110	Prest.	Dyn.	Dyn.	Conn.	6	Monitor M. & O.
Monroe S-9	5	1440	115	32x3½	Goodyear	3½x4½	Own	4	16.90	1⅜—Zen.	Vacuum	Muncie	Mechanics	.....	Own	C. A. S.	Stewart	Firestone	6	.....	U. S. L.	A-L	A-L	Conn.	6	Monroe S-9
Moon 6-48	5	....	122	32x4	Miller	3½x4½	Cont.	6	25.35	1½—Ray.	Vacuum	B. and B.	B-L	Spicer	Timken	Warner	Stewart	Firestone	6	110	Exide	Delco	Delco	Delco	6	Moon 6-48
Moon 6-68	7	....	125	32x4½	Miller	3½x5½	Cont.	6	29.40	1½—Ray.	Vacuum	B. and B.	B-L	Spicer	Timken	Warner	Stewart	Firestone	6	110	Exide	Delco	Delco	Delco	6	Moon 6-68
Moore 30	5	1095	108	30x3½	Firestone	3x5	Own	4	14.40	1—Mar.	Vacuum	Detlaff.	G-L	U. P.	Peru	Ditweiler	Stewart	Firestone	6	80	Willard	A-L	A-L	Conn.	6	Moore 30
Nash 681	5	....	121	33x4	optional	3½x5½	Own	6	25.35	1½—Mar.	Vacuum	B. and B.	Own	Own	Own	Gemmer	Stewart	Firestone	6	106	Willard	Wagner	Wagner	Wagner	6	Nash 681
Nash 682	7	....	127	34x4½	optional	3½x5½	Own	6	25.35	1½—Mar	Vacuum	B. and B.	Own	Own	Own	Gemmer	Stewart	optional	6	100	Willard	Wagner	Wagner	Wagner	6	Nash 682

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Teetor-McFarlan; #, Monson or Duesenberg; R. & V., Root & Van Dervoort. **Carburetor**—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L., Auto-Lite; West., Westinghouse; #, Westinghouse or Auto-Lite; W-L., Ward Leonard; Dyn., Dyneto; N. E., North East; L-N., Leece-Neville; A-C., Allis-Chalmers; Split., Splitdorf; S-H., Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K., Atwater-Kent; Conn., Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W., Bosch-Westinghouse; Split, Splitdorf. **Gearset**—G-L., Grant-Lees; North., Northway; B-L., Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Manville; V-Sicklen, Van Sicklen; A-C., Allis-Chalmers.

Motor Age Monthly Passenger Car Specification Tables

These prices apply to five and seven-passenger models only—These tables are revised and brought up to date monthly

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carbureter Size and Make	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims	Battery Volts	Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltags	Name and Model
National Sextet BB	7	3500	130	32x4½	optional	3½x5½	Own	6	29.40	1½—Ray.	Vacuum	B. and B.	B-L	Arvac	Col.	Warner	Warner	Firestone	6	110	Prest.	West.	West.	Delco	6	National Sextet BB
Nelson D	5	1700	104	32x4	Goodyear	3¼x4¾	Own	4	15.63	1—Zen.	Vacuum	Own	Own	Own	Own	Own	Stewart	Kelsey	12	72	Willard	U. S. L.	U. S. L.	Bosch	12	Nelson D
Noma 1-B	4	2900	128	32x4½	Goodyear	3¼x4½	Cont.	6	25.35	1½ Zen.	Vacuum	B. and B.	Detroit	.....	Timken	Lavine	Stewart	.....	6	104	Willard	Delco	Delco	Delco	6	Noma 1-B
Oakland 34-C	5	1165	115	32x4	Goodyear	2 1/16x4¾	Own	6	18.99	1—Mar.	Vacuum	Own	Muncie	.....	Buick	Saginaw	Stewart	Jaxon	6	85	Prest.	Remy	Remy	Remy	6	Oakland 34-C
Ogren 6-60	6	3250	134	33x5	Goodyear	3¼x5½	Conn.	6	33.75	1⅓—Opt.	Vacuum	B-L	B-L	Arvac	Timken	Own	Warner	Firestone	6	120	Willard	West.	West.	Bosch	6	Ogren 6-60
Oldsmobile 37-A	5	1395	112	32x4	Goodyear	2 1/16x4¾	Own	6	18.99	1¼—John.	Vacuum	Own	Warner	Spicer	West. Mott	Jacox	Stewart	Jaxon	6	80	Willard	Remy	Remy	Remy	6	Oldsmobile 37-A
Oldsmobile 45-B	7	2045	120	33x4½	Goodyear	2¼x4¾	Own	8	26.45	1¼—Ball.	Vacuum	Own	Warner	Spicer	West-Mott	Jacox	Stewart	Jaxon	6	.....	Willard	Delco	Delco	Delco	6	Oldsmobile 45-B
Olympian 45	5	1240	112	32x3½	Miller	3¼x4½	Own	4	16.90	1¼—Strom.	Vacuum	B. and B.	Own	.....	Peru	Warner	Stewart	Perlman	6	.....	U. S. L.	A-L	A-L	Conn.	6	Olympian 45
Overland 4	5	945	100	30x3½	Fisk	3⅜x4	Own	4	18.23	¾—Tillot.	Gravity	B. and B.	Own	.....	Own	Own	.....	.....	6	80	U. S. L.	A-L	A-L	Conn.	6	Overland 4
Owen-Magnetic W-42	7	5500	142	35x5	optional	4x5½	Weid.	6	38.40	—Zen.	Vacuum	Own	Own	Spicer	Amer.	Own	Warner	Firestone	24	.....	Willard	Own	Own	Bosch	28	Owen-Magnetic W-42
Packard 3-25	7	.....	128	35x5	optional	3x5	Own	12	43.20	—Own	Pressure	Own	Own	Spicer	Own	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard 3-25
Packard 3-35	7	.....	136	35x5	optional	3x5	Own	12	43.20	—Own	Pressure	Own	Own	Spicer	Own	Own	Waltham	Firestone	6	120	Willard	Bijur	Bijur	Delco	7	Packard 3-35
Paige 6-42	5	1595	119	32x4	optional	3¼x5	Own	6	23.44	1—Strom.	Vacuum	B. and B.	Own	.....	Salisbury	Jacox	Stewart	Kelsey	6	108	Willard	G. & D.	G. & D.	A-K	6	Paige 6-42
Paige 6-55	7	2195	127	33x4½	optional	3½x5½	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	Own	Spicer	Salisbury	Jacox	Stewart	Kelsey	6	108	Willard	G. & D.	G. & D.	A-K	6	Paige 6-55
Paterson 6-47	7	1725	120	33x4	optional	3¼x4¾	Cont.	6	25.35	1½—Strom.	Vacuum	B. and B.	Durston	Hartford	Stan-Par.	Jacox	Stewart	Jaxon	6	80	Willard	Delco	Delco	Delco	6	Paterson 6-47
Peerless Series 6	7	2900	125	34x4	Goodyear	3¼x5	Own	8	33.80	1¾—Ball.	Vacuum	B-L	B-L	.....	Timken	Gemmer	V. Sicklen	Stanweld	6	125	Willard	A-L	A-L	A-L	6	Peerless Series 6
Phianna R	5	9000	125	32x4½	U. S.	3 29/32x6	Own	4	24.70	1½—Strom.	Vacuum	Own	Own	Own	Amer.	Own	Warner	Firestone	6	.....	Willard	W-L	W-L	Bosch	6	Phianna R
Piedmont 4-30	5	1335	116	32x3½	Firestone	3½x5	Own	4	19.60	1—Carter	Vacuum	B. and B.	G-L	Hartford	Peru	Ditweiler	Stewart	Firestone	6	90	Willard	Delco	Dyn.	Delco	6	Piedmont 4-30
Piedmont 6-40	5	1865	122	32x4	Firestone	3¼x4½	Cont.	6	25.35	—Strom.	Vacuum	B. and B.	G-L	Hartford	Timken	Warner	Stewart	Firestone	6	90	Willard	Remy	Remy	Remy	6	Piedmont 6-40
Pierce-Arrow 38	7	7250	134	34x4½	Goodrich	4x5½	Own	6	38.40	—Own	Pressure	Own	Own	Own	Own	Own	Waltham	Goodrich	6-8	135	.....	West.	West.	Delco	6	Pierce-Arrow 38
Pierce-Arrow 48	7	7750	142	35x5	Goodrich	4½x5½	Own	6	48.60	—Own	Pressure	Own	Own	Own	Own	Own	Waltham	Goodrich	6-8	135	.....	West.	West.	Delco	6	Pierce-Arrow 48
Pilot 6-45	5	1650	120	32x4	Miller	3¼x5	Teetor	6	23.44	1—Tillot.	Vacuum	B. and B.	Muncie	Hart	Spacke	Ditweiler	Stewart	Standard	6	100	Prest.	Delco	Delco	Delco	6	Pilot 6-45
Porter 45	7	9400	142	35x5	U. S.	4.6x6¾	Own	4	34.18	2—Zen.	Pressure	M. and E.	Own	.....	Own	Own	Stewart	Firestone	12	118	Prest.	West.	West.	Berl.	12	Porter 45
Premier 6-D	7	4300	126¾	32x4½	Firestone	3½x5½	Own	6	27.34	1¼—Johns.	Vacuum	B. and B.	Own	Peters	Stan-Par.	Warner	Own	Firestone	6	120	Willard	Delco	Delco	Delco	6	Premier 6-D
Reo T-6	5	1650	120	33x4	U. S.	3 3/16x5	Own	6	24.30	1¼—Ray.	Vacuum	Own	Own	Own	Own	Own	Stewart	Firestone	6	115	Willard	N. E.	N. E.	N. E.	6	Reo T-6
ReVere C	7	4250	131	32x4½	optional	4½x6	Monsen	4	30.63	1¾—Strom.	Vacuum	B-L	B-L	Spicer	Standard	Gemmer	Stewart	Houk	6	120	Willard	West.	West.	Bosch	6	ReVere C
Roamer 6-54	7	3075	128½	32x4½	Goodyear	3½x5¼	Cont.	6	29.40	1¼—Strom.	Vacuum	B. and B.	G-L	Ther-H	Stan-Par.	Jacox	Warner	Stanweld	6	90	Col.	Bijur	Bijur	Bosch	6	Roamer 6-54
R & V Knight J	7	3150	127	32x4½	optional	3½x4½	Own	6	29.40	1¼—Scheb.	Vacuum	B. and B.	B-L	Spicer	Timken	Jacox	Stewart	Firestone	6	117	Willard	Wagner	Wagner	Wagner	6	R & V Knight J
R & V Knight R	5	2150	115	32x4	optional	3¾x5	Own	4	22.50	1¼—Scheb.	Vacuum	B. and B.	B-L	Spicer	Salisbury	Jacox	Stewart	Firestone	6	117	Willard	Wagner	Wagner	Wagner	6	R & V Knight R
Saxon	5	.....	112	32x4	.....	3¾x5	.....	4	18.23	.....	.....	.....	.....	.....	.....	.....	.....	Firestone	.....	.....	Prest.	Wagner	Wagner	Wagner	6	Saxon
Sayers Six	5	1795	118	33x4	Goodyear	3¼x4½	Cont.	6	25.35	1—Zen.	Vacuum	B. and B.	G-L	Arvac	Stan-Par.	Warner	Stewart	Firestone	6	80	Willard	Delco	Delco	Delco	6	Sayers Six
Scripps-Booth B-39	5	1425	115	32x4	Goodyear	2 3/16x4¾	North.	6	18.99	1—Mar.	Vacuum	North.	Warner	Peters	West-Mott	Jacox	Stewart	Kelsey	6	85	Prest.	Remy	Remy	Remy	6	Scripps-Booth B-39
Seneca L	5	1185	108	30x3½	Miller	3⅛x4½	Le Roi	4	15.63	1—Scheb.	Vacuum	B. and B.	Warner	.....	Peru	Ditweiler	Stewart	Jackson	6	88	Prest.	A-C	A-C	Conn.	6	Seneca L
Singer 20	7	5800	108	33x5	Goodyear	2½x5	Weid.	12	39.68	1½—Strom.	Vacuum	Covert	Covert	Spicer	Timken	Ross	Stewart	Own	6	162	Willard	West.	West.	Phil.	6	Singer 20
Skelton	5	1245	112	32x3½	optional	3½x5	Lycoming	4	19.60	1—Carter	Vacuum	B. and B.	Muncie	Universal	Peru	C. A. S.	Stewart	Stanweld	6	85	Prest.	West.	West.	Conn.	6	Skelton
Spacke S-20	2	295	90	28x3	U. S.	3½x3.67	Own	2	9.80	1—Carter	Gravity	Own	Own	.....	Own	Own	.....	.....	.....	.....	.....	.....	.....	A-K	.....	Spacke S-20
Standard 8-I	7	3000	127	34x4½	optional	3¼x5	Own	8	33.80	1½—Zen.	Vacuum	B. and B.	G-L	Arvac	Timken	Gemmer	Stewart	Firestone	6	160	Willard	West.	West.	Splt.	6	Standard- 8-I
Stearns SKL-4	5	2350	125	34x4½	Goodrich	3¼x5½	Own	4	22.50	1¼—Scheb.	Vacuum	Own	Own	Spicer	Own	Own	V. Sicklen	Firestone	12	65	Willard	West.	West.	A-K	12	Stearns SKL-4
Stephens 80	6	2050	122	33x4½	Fisk	3¼x4½	R & V	6	25.35	1¼—Tillot.	Vacuum	B. and B.	Mechanics	Mechanics	Stan-Par.	C. A. S.	Stewart	Stanweld	6-8	116	U. S. L.	A-L	A-L	A-L	6	Stephens 80
Studebaker E-J	5	1435	112	32x4	.....	3¼x4½	Own	6	23.44	—Strom.	Vacuum	Own	Own	.....	Own	Own	V. Sicklen	Kelsey	6	80	Willard	Wagner	Wagner	Wagner	6	Studebaker E-J
Studebaker E-G	7	2250	126	33x4½	Goodyear	3½x5	Own	6	36.04	1½—Ball	Vacuum	Own	Own	Spicer	Own	Own	V. Sicklen	Kelsey	6	80	Willard	Wagner	Wagner	Wagner	6	Studebaker E-G
Studebaker E-H	5	1785	119	32x4	.....	3½x5	Own	6	29.40	1¼—Strom.	Vacuum	Own	Own	Spicer	Own	Own	V. Sicklen	Kelsey	6	80	Willard	Wagner	Wagner	Wagner	6	Studebaker E-H
Stutz H	6	3350	130	32x4½	optional	3⅜x6	Own	4	30.63	1½—Strom.	Pressure	Own	Own	Own	Own	Gemmer	Warner	.....	6	120	Willard	Remy	Remy	Delco	6	Stutz H
Templar A-445	5	2685	118	32x4	optional	3½x5½	Own	4	18.23	1¼—Strom.	Vacuum	B. and B.	Detroit	Hardy	American	C. A. S.	Warner	Firestone	6	100	.....	Bijur	Bijur	Simms	6	Templar A-445
Tulsa E	5	1335	117½	33x4	.....	5x3½	H. C.	4	19.60	1—Miller	Vacuum	B. and B.	Muncie	.....	Salisbury	C. A. S.	Stewart	Stanweld	6	80	Exide	Dyn.	Dyn.	Conn.	6	Tulsa E

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco. Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Teetor-McFarlan; #, Monson or Duesenberg; R. & V., Root & Van Dervoort. **Carburetor**—Strom., Stromberg; Zen., Zenith; Ray., Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L., Auto-Lite; West., Westinghouse; #, Westinghouse or Auto-Lite; W-L., Ward Leonard; Dyn., Dyneto; N. E., North East; L-N., Lecce-Neville; A-C., Allis-Chalmers; Split., Splitdorf; S-H., Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K., Atwater-Kent; Conn., Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W., Bosch-Westinghouse; Split, Splitdorf. **Gearset**—G-L., Grant-Lees; North., Northway; B-L., Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Manville; V-Sicklen, Van Sicklen; A-C., Allis-Chalmers.

Name and Model	Seating Capacity	Price	Wheelbase	Rear Tire Size	Make of Tire	Bore and Stroke	Engine Make	No. Cylinders	N. A. C. C. HP.	Carbureter Size and Make	Fuel Feed	Clutch	Gearset	Universals	Rear Axle	Steering Gear	Speedometer	Rims		Battery Amp.	Battery Make	Generator Make	Motor Make	Ignition Make	Lamp Voltages	Name and Model
Velie 48	5	1785	115	32x4	Goodyear	3½x4½	Cont.	6	25.35	1¼—Ray.	Vacuum	B. and B.	Durston	Arvac	Timken	Gemmer	V. Sicklen	Firestone	6	120	Willard	Bijur	Bijur	Bijur	6	Velie 48
Velie 34	5	1485	112	32x3½	optional	3⅛x4¼	Falls	6	23.44	—Ray.	Vacuum	B. and B.	Durston	.....	Col.	Gemmer	V. Sicklen	Firestone	6	100	Willard	West.	West.	A-K	6	Velie 34
Westcott C-38	5	2390	118	33x4	Firestone	3½x4½	Cont.	6	25.35	1¼—Ray.	Vacuum	B. and B.	Warner	Peters	Timken	Gemmer	V. Sicklen	Firestone	6	116	Willard	Delco	Delco	Delco	6	Westcott C-38
Westcott C-48	7	2890	125	23x4½	Firestone	3½x5¼	Cont.	6	29.40	1¼—Ray.	Vacuum	B. and B.	B-L	Peters	Timken	Gemmer	V. Sicklen	Firestone	6	80	Willard	Delco	Delco	Delco	6	Westcott C-48
Willys-Knight 88-4	7	1725	121	34x4½	.....	4⅛x4½	Own	4	27.23	1¼—Tillot.	Vacuum	Own	Own	Own	Own	Own	Warner	Stanweld	6	120	U. S. L.	A-L	A-L	Conn.	6	Willys-Knight 88-4
Winther 61	5	....	119½	33x4	Goodyear	3¼x5	H-S	6	25.35	1¼—Strom.	Vacuum	Warner	Warner	Peters	Spacke	Lavine	Stewart	Stanweld	6	.....	Willard	West.	West.	West.	6	Winther 61
Winton 25	7	4250	132	35x5	optional	3¾x5¼	Own	6	33.75	1½—Strom.	Vacuum	.....	.....	.....	.....	.....	Warner	Firestone	6	120	Willard	Bijur	Bijur	Bosch	6	Winton 25
STEAM CARS																										
Stanley 735	7	4275	130	4x4½	Goodyear	4–5	Own	2	....	none	none	none	none	.....	Own	Warner	V. Sicklen	Firestone	6	116	Willard	Remy	None	None	6	Stanley 735

Engines—Ruten., Rutenber; Cont., Continental; Weid., Weidely; North., Northway; H-S., Herschell-Spillman; Lyco., Lycoming; D-Lyco., Dort-Lycoming; G. B. & S., Golden, Belknap & Swartz; T-McF., Teetor-McFarlan; #, Monson or Duesenberg; R. & V., Root & Van Dervoort. **Carbureter**—Strom., Stromberg; Zen., Zenith; Ray.. Rayfield; John., Johnson; Mar., Marvel; Sund., Sunderman; Stew., Stewart; H-K., Holley-Kingston; Newc., Newcomb; Scheb., Schebler; Tillot., Tillotson; Johns., Johnston. **Generator and Motor**—A-L., Auto-Lite; West., Westinghouse; #, Westinghouse or Auto-Lite; W-L., Ward Leonard; Dyn., Dyneto; N. E., North East; L-N., Leece-Neville; A-C., Allis-Chalmers; Split., Splitdorf; S-H., Simms-Huff; G. & D., Gray & Davis. **Ignition**—A-K., Atwater-Kent; Conn., Connecticut; Eise., Eisemann; West., Westinghouse; Will., Willard; N. E., North East; K-Remy, Kingston-Remy; Berl., Berling; Bosch-W., Bosch-Westinghouse; Split, Splitdorf. **Gearset**—G-L., Grant-Lees; North., Northway; B-L., Brown-Lipe. **Rear Axle**—Col., Columbia; W-Weiss, Walker-Weiss; C-Timk., Cadillac-Timken; West-Mott, Weston-Mott. **Universals**—Hart., Hartford; Ther-H., Thermoid-Hardy; U. M. Co., Universal Machine Co. **Speedometer**—J-Man., Johns-Manville; V-Sicklen, Van Sicklen; A-C., Allis-Chalmers.

N. A. C. C. CHANGES QUARTERS

New York, Feb. 2—Having outgrown its home at East Forty-second street, the National Automobile Chamber of Commerce plans to move, on May 1, to the new Marlin-Rockwell building, Madison avenue and Forty-sixth street.

In the construction of the new building, the fourteenth and fifteenth floors of which will be occupied by the chamber, the plans have provided not alone for ample room for the new departments and rapidly expanding work of the N. A. C. C., but for a board room 28 by 53 ft., with vaulted ceiling, capable of comfortably seating 225 people. It is planned to make this room a central headquarters for meetings of various divisions of the industry.

The fourteenth floor provides for the executive officials and the active departments, including foreign trade, legislative, traffic, motor truck, rural motor express, service, publicity, statistical, show, highways, patents and others.

The fifteenth floor will be occupied by the Board Room, containing 1484 sq. ft. complete in modern design and equipped with shutters for eliminating daylight when lantern slides or moving pictures are used. Means are provided for turning the room into two or three smaller meeting rooms.

The present quarters of the N. A. C. C. were occupied first in 1900 by the National Association of Automobile Manufacturers, and the space expanded from time to time through the various reorganizations which eventually led to the formation of the National Chamber of Commerce.

WE ACKNOWLEDGE AN ERROR

A serious typographical error was made on page 160-B of the Jan. 1 issue of MOTOR AGE, stating that the L. H. Gilmer Co. of Philadelphia was manufacturing 820,000 fan belts a day. The line should have read "20,000 belts per day."

DORRIS IS REORGANIZED

St. Louis, Jan. 30—The recently organized Dorris Motors Corp. of Wilmington, Del., capitalized at $3,000,000, has purchased the assets and good will of the Dorris Motor Car Co. of St. Louis and the Astra Motors Corp., which was formed a few months ago to manufacture the Astra car in St. Louis, according to an official announcement made by B. R. Parrot, president of the Delaware company, and Webster Coburn, vice-president and general manager of the former Dorris plant.

The new organization will continue to manufacture the Dorris trucks and passenger cars, only that the production will be augmented by the addition of a total of 200,000 square feet of floor space which will be provided by the proposed erection of several new buildings in the immediate vicinity of the present Dorris plant in St. Louis.

An additional factory will also be provided for the production of the Astra touring car which will soon be announced on the passenger car market at the price of $1,318. The proposed plans already submitted by a local engineering concern indicate that the Astra car will be built in a three-story building adjoining the Dorris property. The dimensions of this building will be 180 by 200 ft.

INFORMATION FOR "ORPHAN CARS"

Detroit, Jan. 31—Due to the vast amount of correspondence received from motorists throughout the country in reference to car troubles, the Puritan Machine Company, Lafayette boulevard and Tenth street, Detroit, have found it necessary to install a "Motor Trouble Desk."

Men thoroughly familiar with orphan cars, and motor car troubles, are in charge of this department and any motorist is at liberty to write the "Motor Trouble Desk" at the Puritan and will receive all the helpful information the Puritan trouble specialists have at their command. This information is yours for the asking. It is absolutely free.

KOKOMO RUBBER CO. BUYS LOUISVILLE BRANCH SITE

Louisville, Ky., Jan. 30—The Kokomo Rubber Co. has accepted plans for a permanent building to house its Louisville branch. This was established six months ago, and the tire sales in the Kentucky and Tennessee territory during this period have more than justified the establishment of a distributing headquarters for the states immediately south of the Ohio river.

A site has been purchased and the work of constructing a two-story building with basement will begin at once. The lower floor will be occupied by the Louisville retail sales force.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

New Brunswick, N. J.	Annual Show	Jan. 31 to Feb. 7
Minneapolis, St. Paul	Minn. Automobile Trade Ass'n	Jan. 31 to Feb. 7
Bridgeport, Conn.	Eighth Annual Show	Feb. 2 to 7
Toledo, O.	Terminal Auditorium	Feb. 2 to 7
Rochester, N. Y.	Rochester Auto Trades Ass'n	Feb. 2 to 7
Baltimore, Md.	Automobile Show	Feb. 3 to 7
Wilmington, Del.	Hotel duPont	Feb. 3 to 8
Peoria, Ill.	Automobile Dealers' & Acc. Ass'n	Feb. 4 to 7
Charlotte, N. C.	Charlotte Automobile Trade Ass'n	Feb. 9 to 14
Greenfield, Mass.	Mass. State Armory	Feb. 9 to 14
New Haven, Conn.	Automobile Dealers' Ass'n	Feb. 9 to 14
Nashville, Tenn.	Automobile Show	Feb. 9 to 14
Salt Lake City	Automobile Show	Feb. 9 to 14
Cedar Rapids, Iowa	Automobile Show	Feb. 9 to 14
Deadwood, S. D.	Deadwood Business Club	February
Council Bluffs, Ia.	Automobile Dealers' Ass'n	Feb. 10 to 14
Quincy, Ill.	Automobile Show	Feb. 10 to 15
Evansville, Ind.	Evansville Dealers' Ass'n	Feb. 11 to 14
Albany, N. Y.	Automobile Show	Feb. 14 to 21
Brooklyn, N. Y.	Motor Vehicle Dealers' Ass'n	Feb. 14 to 21
Detroit, Mich.	Detroit Automobile Dealers' Ass'n	Feb. 14 to 21
San Antonio, Tex.	Automobile Show	Feb. 14 to 22
Des Moines, Ia.	Herring Motor Co.	Feb. 16 to 21
Manchester, N. H.	Automobile Show, Academy	Feb. 16 to 20
St. Louis	St. Louis Automobile Mfrs. & Dealers' Ass'n	Feb. 16 to 21
New Haven, Conn.	Automobile Show	Feb. 16 to 21
Indianapolis, Ind.	Automobile Show	Feb. 22 to 28
Duluth, Minn.	Automobile Show	Feb. 23 to 28
Waterloo, Iowa	First Annual Show	Feb. 21 to 26
San Francisco	San Francisco Motor Car Dealers' Ass'n	Feb. 21 to 28
Ottawa, Canada	Motor Show	Feb. 21 to 28
Bethlehem, Pa.	Sixth Annual Show	Feb. 23 to 28
Louisville, Ky.	Louisville Automobile Dealers' Ass'n	Feb. 23 to 28
Pittsfield, Mass.	Mass. State Armory	Feb. 23 to 28
St. Joseph, Mo.	St. Joseph Automobile Dealers' Ass'n	March 1 to 6
Portland, Ore.	Portland Automobile Trade Ass'n	Feb. 23 to 28
Grand Rapids, Mich.	Automobile Show	Feb. 23 to 28
Wichita, Kans.	Automobile Show	Feb. 23 to 30
Columbus, Ohio	Memorial Hall	Feb. 24 to 28
Fort Dodge, Ia.	Automobile Dealers' Ass'n	Feb. 24 to 28
Newark, N. J.	First Regiment Armory	Feb. 28 to March 6
Omaha, Nebr.	Automobile Show	March 1 to 6
Scranton, Pa.	Automobile Show	March 1 to 6
Buffalo, N. Y.	Buffalo Automobile Dealers' Ass'n	March 1 to 6
Portland, Maine	Portland Automobile Dealers' Ass'n	March 1 to 6
Perth Amboy, N. J.	First Automobile Show	March 1 to 6
Lyons	Automobile Show	March 1 to 8
Springfield, Mass.	Springfield Automotive Dealers' Ass'n	March 1 to 7
Syracuse, N. Y.	Syracuse Automobile Dealers' Ass'n	March 1 to 6
Seattle, Wash.	Seattle Automobile Show	March 1 to 6
Denver	Denver Automobile Trade Ass'n	March 2 to 6
Clinton, Iowa	Clinton Automobile Dealers' Ass'n	March 3 to 6
Quincy, Ill.	Quincy Automobile Dealers' Ass'n	March
Lancaster, Pa.	Automobile Show	March 3 to 6
Indianapolis, Ind.	Automobile Show	March 8 to 13
Jersey City, N. J.	Automobile Show	March
Boston, Mass.	Mechanics' Bldg.	March 13 to 20
New Orleans	Automobile Show	March
Little Rock, Ark.	Liberty Hall	March 2 to 6
Great Falls, Mont.	Automobile Show	March 15 to 22
Wilkes-Barre, Pa.	Passenger Car & Truck Show	March 15 to 22
Oklahoma City, Okla.	Oklahoma City Dealers' Ass'n	March 22 to 27
Albany, Ala.	Automobile Show	April 6 to 10

TRUCK SHOWS

Peoria, Ill.	Automobile Dealers' & Acc. Ass'n	Feb. 9 to 10
New Haven, Conn.	Automobile Dealers' Ass'n	Feb. 16 to 21

TRACTOR SHOWS

Michita, Kan.	Wichita Tresher-Tractor Club	Feb. 9 to 14
Kansas City, Mo.	Kansas City Tractor Club	Feb. 16 to 21

MISCELLANEOUS CONVENTIONS AND MEETINGS

Louisville, Ky.	Seventeenth Annual Convention American Road Builders' Ass'n; Tenth American Good Roads Congress and Eleventh National Good Roads Show	Feb. 9 to 13
Lake Charles, La.	Louisiana-Mississippi Automotive Trade Ass'n Convention	March 17 to 18

Missouri Shows Car Increase—The number of motor vehicles in Missouri during 1919 was 244,427, as against 188,040 in 1918, a gain of 56,387, according to the report of the Secretary of State of Missouri. The gain since 1911, when the state had 16,287 motor vehicles, is 228,040.

The following table shows the number of motor vehicles and the revenue from licenses in Missouri each year:

Year	Number of Vehicles	Revenues from Licenses
1911	16,387	$ 55,506.00
1912	24,379	117,382.25
1913	38,140	173,810.50
1914	54,489	235,873.50
1915	76,462	323,289.50
1916	107,865	439,315.00
1917	151,027	617,942.50
1918	188,040	1,394,762.19
1919	244,427	1,725,076.70

Montreal Automobile Ass'n Expects Big Year—Pres. M. J. Stack of the Montreal Automobile Association, announces that elaborate preparations are now being made for a record year, in the activities of the association.

The annual membership meeting will be held on April 5th, and the election of officers and also committees will take place on that date. It is intended to appoint committees for the following objects:

Membership, safety first, sign placing, streets and roads, entertainment, publicity, etc., and an active membership campaign will immediately be organized. Three thousand members for 1920 is to be the big slogan for the coming season.

War Department Car Data—Fifteen thousand nine hundred and thirty-nine motor vehicles are reported in storage available for issue by the Director of Purchase and Storage of the War Department. Of these, 15,331 are serviceable and 608 are unserviceable. The following table shows the status. All ambulances are of General Motor Co. manufacture. Other items include various types.

Types	Serviceable	Unserviceable	Total
Ambulances	34	.....	34
Cars	436	119	555
Trucks	4,410	472	4,882
Bicycles	5,578	.....	5,578
Motorcycles with side cars	209	7	216
Motorcycles, solos	553	.....	553
Bodies, truck	2,822	.....	2,822
Chassis	515	.....	515
Side-cars	774	10	784
Total	15,331	608	15,939

Oregon Shows Car Increase—Motor car registration in Oregon for 1919 will total approximately 83,500, according to figures from the office of the secretary of state. This is a gain of 20,175, or 24 per cent. over registrations for last year. These figures include trucks as well as passenger cars. The number of cars in the state is now 600 per cent greater than in 1913, the year before the war. In that year Oregon had only 13,957 cars, the total gain to date being 69,543 in only six years.